Government decisions on income redistribution and public production
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1 Survey of relevant economic and political models

1.1 Introduction

A basic concept in economic theory is rational choice. This concept is commonly understood as to refer to decisions of individuals that are in accordance with the promotion of their own interests. Most of the models to be discussed in this chapter assume this type of behavior. Although it is often noticed that the concept of 'rational man' is only an analytical tool [cf. Becker (1993)], it is, from a positive perspective, important to understand how the behavior of 'rational man' is related to the behavior of 'real man'. In comparing 'rational man' with 'real man', Selten notes that rational man is regarded as "(...) a mythical hero whose powers of computation and cogitation are unlimited. For this mythical hero it is easy to form consistent probability and preference judgments, but not for ordinary people (...)" [Selten (1991, p. 4)].

Several reasons are mentioned in the (economic) literature why 'rational man' would not give a satisfactory description of 'real man'. These reasons can be categorized under the following four headings: missing information, restricted computational ability, emotions and moral sentiments. Before proceeding with the introduction, the consequences of neglecting these issues will be discussed briefly [see for a more extensive discussion of these issues, Simon (1957, 1987), Conlisk (1996) and Rubinstein (1998)].

With respect to missing information, it should be noticed that individuals can gather more information if they increase their effort to do so. Individuals can rationally decide whether it is worthwhile to gather more information by comparing the costs of the extra effort with the benefits of the extra information. Decisions with respect to information gathering are, therefore, rational, as long as information costs are incorporated in the model. Apart from missing information that can be uncovered by increasing the effort, individuals will also miss some information that cannot be disclosed. This may be the case for private information of other individuals that will only become common information if these individuals truthfully reveal this information. If a truthful revelation mechanism is absent, individuals may hide private information, or give wrong information. In traditional general equilibrium models, where government decisions are exogenously given, consumers and producers transmit information with respect to, respectively, preferences and technology through prices. The price mechanism leads to a truthful revelation of information. If government decisions are endogenous, information transmission between private agents and the government, must be taken into consideration. However, the mechanisms that are
actually designed for the transmission of information between private and public sector agents do not necessarily truthfully reveal that information. This will be further discussed in Section 1.3.

A second type of information that is hard to obtain has to do with the future. The contingency of future developments implies that individuals have incomplete information about the future. As for other types of information, individuals can learn more about future developments if they increase their efforts, but individuals are not able to know the exact future developments because of contingency [cf. WILLIAMSON (1985)]. To reduce surprise effects, individuals can take out insurances that cover possible future situations. In that case, the problem of contingency can be dissolved, if there are enough insurance markets. To take account of the contingency of future developments, the incorporation of insurance markets in the model, in addition to information costs, suffices. If there are, however, insufficient insurance markets contingency remains a problem [cf. NEWBERRY (1989)].

The limited capability to calculate arises in particular for dynamic decisionmaking.\(^1\) It appears, e.g., that participants in economic experiments find it difficult to determine the increase in value of a given amount of money over a particular period of time, with a given, constant interest rate. As for missing information, individuals can reduce the limited capability to calculate by increasing the effort, either by learning or by hiring capability from others. Individuals can compare the costs that follow from this higher effort with the benefits they receive from the better information and decide upon an increase the effort. In this monograph, these calculation costs will be neglected. This may, in particular, lead to misspecifications if dynamic decisionmaking is taken into account. Dynamic decisionmaking will be discussed in more detail in the introduction of Part II.

Rational man is generally regarded as an individual without emotions and moral sentiments. SEN (1977) labels such an individual a rational fool. Conceptually, the difference between emotions and morals lays, according to Sen, in the effect on an individual’s welfare. Emotions affect one’s welfare directly (the suffering of the lonesome tramp in your neighborhood makes you feel uncomfortable), while moral sentiments refer to matters that do not affect welfare directly, but that are considered

\(^1\) Two other ‘irrational’ aspects of dynamic decisionmaking that will not be discussed here are changes in preferences [cf. SCHTOVSKY (1976), STIGLER AND BECKER (1977) and PERSKY (1993)] and conflicts between short run and long run interests [cf. ELSTER (1979) and LOEWENSTEIN AND THALER (1989)].
as right or wrong. Sen refers, in this respect, to sympathy and commitment.\footnote{More or less similar are the concepts of love and duty in \textsc{Elster} (1982).} Commitment is in particular important in the case of public goods. The optimal allocation of public goods depends on the preferences individuals have with respect to these goods. A correct revelation of preferences is required for the optimal allocation. Selfish individuals will have the tendency to free ride and will, therefore, trivialize their preference for the public good. If individuals find it wrong to cheat and commit themselves to tell the truth, preferences will be revealed correctly and public goods can be allocated optimally. In the absence of commitment rational individuals will have the tendency to free ride, which leads to an outcome that is not optimal.\footnote{This problem differs from the traditional prisoner's dilemma. In the prisoner's dilemma, there is full information about preferences. If individuals will not commit themselves to the Pareto efficient solution, an institution with compulsory power can enforce them to do so [cf. \textsc{Atkinson and Stiglitz} (1980) and \textsc{Inman} (1987)]. In the dilemma at hand, preferences are private information for individuals and unknown to others. The institution is, therefore, not able to determine the optimal, Pareto efficient, allocation.} But even if a correct revelation of preferences is possible, individuals may find the contribution scheme unfair. An individual may, for example, find it fair that everyone contributes the same amount to the public good, notwithstanding the nonoptimal solution it leads to. This individual may find it unfair that he or she has to contribute more to the public good than others, because of the higher utility he or she attaches to this good, and decide not to contribute to the public good. The refusal to contribute may lead to a lower level of the public good, and, therefore, to a loss in utility, but the individual prefers this loss above an unfair contribution scheme [compare the possibility to destroy one's endowment in \textsc{Aumann and Kurz} (1977)]. The decision to refuse an unfair offer, while accepting it would be more beneficial, is also made by a significant number of participants in ultimatum game experiments [cf. \textsc{Kahneman et al.} (1986) and \textsc{Ledyard} (1995)].

In addition to these moral sentiments or commitment, decisions are also influenced by emotions or sympathy. In contrasts with moral sentiments, emotions affect an individual's welfare. If these emotions are taken into account, models may give fairly different results. The sentiments of parents for their children may lead to a neutral effect of the intergenerational income distribution on consumption, as in the Ricardian Equivalence theorem in \textsc{Barro} (1974) and the Rotten Kid theorem in \textsc{Becker} (1974). Other-regarding behavior may also lead to neutrality between private charity and government donations that are financed by lump-sum taxes [cf. \textsc{Warr} (1982)]. On the
other hand, these neutrality results need not hold if individuals, for example, get a warm glow from giving, as demonstrated in ANDREONI (1989). This result is due to the fact that the warm glow has a positive effect on the donor's utility, which makes voluntary giving and involuntary giving imperfect substitutes. Perfect substitutability is a necessary condition for the neutrality results. Emotions and moral sentiments are further discussed in Chapter 3, where also other motives of other-directedness are taken into account.

The above discussion indicates that there are some differences between 'rational man' and 'real man'. These differences are most apparent for intertemporal decisionmaking. Intertemporal decisions are rather more complex than temporal decisions, which makes them more demanding for the computational abilities of individuals. Furthermore, the information required for intertemporal decision is more difficult to collect and the development of the variables that may affect the decisions are uncertain. Finally, intertemporal decisions capture the behavior of an individual over a longer time, possibly over the individual's lifetime. In this time period commitment (and tastes) may change. For these reasons, the concept of rational choice is, in our view, less accurate for the description of intertemporal behavior than for the decisions of temporal behavior.

The remainder of this chapter gives an overview of the relevant literature. The aim of this monograph is to bring together two types of models: (computable) general equilibrium models and public choice models. Until recently, these models concerned two different areas of research that did hardly intermingle. The overview in this chapter not only puts our research into perspective, but also intends to give scholars in the one area, who are not familiar with the research in the other area, appreciation of the research in the other area. We will focus on the literature that is relevant for the line of reasoning or for the analyses in the next chapters.

The organization of this chapter is as follows. Section 1.2 concentrates on computable general equilibrium models. It starts with a definition and continues with a discussion of five types of computable general equilibrium models that are used for the analysis of fiscal policies: linearized models, the Shoven-Whalley model with a simple present/future choice, the Ramsey model with individuals having an infinite horizon, and overlapping generations models.

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4 The label 'simple present/future choice' for this type of models is in BALLARD (1990a). That paper discusses the features of such models as well as of the Ramsey model and overlapping generations models.
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overlapping generations models and econometric models. Also models that derive the values of some policy variables (usually the provision of public goods) from a postulated objective function of the government are discussed. Section 1.3 deals with political decisionmaking models. The most important participants in the political decisionmaking process are voters, interest groups, bureaucrats and politicians. Several public choice theories regarding the behavior of these agents are discussed. The section closes with a discussion of four main models of political decisionmaking: the median voter model, the probabilistic voting model, the interest function approach and the Leviathan model. Political-economic models that take account of the economic feedback of political decisions are presented in Sections 1.4 and 1.5. Section 1.4 pays attention to studies that model the feedback mechanisms by way of a macroeconomic model. The section first goes into the political business cycle theory, Hibbs’ partisan theory and the Frey-Schneider model that synthesizes in a sense the political business cycle theory and the partisan theory. Then the literature on the credibility of macroeconomic policies is reviewed. The section closes with a discussion of studies that model the process of political decisionmaking more explicitly and pay, in particular, attention to the influence of interest groups on this process. The studies that are referred to in Section 1.5 have in common that they incorporate a political model in a general equilibrium model. The issues that are analyzed in these studies, and the political models that are used for this analysis differ. Median voter models that study redistribution and fiscal federalism are discussed, as well as models that analyze the influence of lobbying on trade policies. Finally, some studies that incorporate a probabilistic voting model in a computable general equilibrium model are addressed. Section 1.6 concludes.

1.2 Computable general equilibrium models

1.2.1 Introduction

The assumption of rational choice is an important characteristic of general equilibrium models. Consumers are supposed to maximize utility subject to the restriction that their expenditures do not exceed the revenues they receive from the utilization of their endowments, while producers are assumed to maximize profits, subject to a technology constraint. A second characteristic of general equilibrium models is the interdependency of demand and supply. Demand for commodities is confronted with the supply of these commodities on markets. Arguments for the market-clearing condition date back to Adam Smith’s invisible hand and have in general a logical
rather than an empirical basis. A formal elaboration of the two characteristics was first taken at hand in WALRAS (1874). In the middle of this century Arrow and Debreu put the formalization of the theory a step further and developed the model that since then has become standard [see, e.g., ARROW AND HAHN (1971) for an extensive exposition of the theory].

The general equilibrium model as developed by Arrow and Debreu has a high degree of abstraction. General equilibrium models that can be numerically solved and (in principle) empirically tested are referred to as computable general equilibrium models. Although these models are less abstract than the original Arrow-Debreu model, they preserve the micro-economic foundation, the confrontation of demand and supply on markets and the equilibrium assumption. They are used for the analysis of alternative government policies. Particularly fiscal policies (including taxes, subsidies, redistribution schemes, public expenditures and externalities) and trade and tariff policies are analyzed. The review in this section concentrates on the former type of models. For a review of models on trade and tariffs, see DERVIS ET AL. (1982), SHOVEN AND WHALLEY (1984, 1992) and DE MELO (1988).

In this section, different types of computable general equilibrium models are surveyed in Subsection 1.2.2. Five types of models are distinguished: linearized models, sequential dynamic models with implicit savings, full dynamic models with infinite horizons, full dynamic models with overlapping generations and econometric general equilibrium models. Subsection 1.2.3 discusses how general equilibrium models deal with government variables. First, attention is paid to optimal taxation models. Then the incorporation of public good provision is examined. In both cases a benevolent government is assumed. Some preliminary conclusions are given in Subsection 1.2.4.

1.2.2 Computable general equilibrium models

The use of a general equilibrium model for the analysis of fiscal policies was initiated by HARBERGER (1962). In that paper the incidence of a corporate income tax is analyzed in a two-sector model. The tax applies to one of these sectors, referred to as the corporate sector, while the other sector, the noncorporate sector, is not taxed. Both sectors use labor as well as capital as input factors for the production of a private...
commodity. The corporate income tax is levied on the capital used in the corporate sector. The introduction of this tax leads to a substitution from capital to labor input in the corporate sector. The consequent decrease in the net rate of return for capital and the assumption that total capital supply is fixed, causes the demand for capital in the noncorporate sector to increase. The lower rate of return on capital in the latter sector indicates that the corporate income tax is borne by capital in both sectors and not only by capital in the taxed corporate sector. With respect to consumption, Harberger assumes that there is only one consumer. The consumer maximizes utility from the two private commodities subject to the budget condition, which restricts the expenditures to the revenues that the consumer receives from the supply of labor and capital and from a lump sum transfer from the government. The lump sum transfer is financed with the revenues of the corporate income tax. Although the Harberger model contains only the elementary building blocks of a computable general equilibrium model, it shows an important feature of these models. Due to the general equilibrium character of the model, substitution effects between input factors and between sectors are taken into consideration, which makes it possible to investigate how the tax burden is distributed among different agents. From an economic perspective it is more important to know who bears the tax burden than who pays the taxes.

To keep the model analytically tractable, Harberger used linear approximations of the behavioral equations for consumers and producers. The system of differential equations thus obtained is, therefore, only appropriate for the analysis of small tax changes. Furthermore, Harberger minimized the number of production sectors and consumer groups, which gave him the opportunity to give a convenient presentation of the model. The investigation of larger changes in taxes requires a non-linearized model. Such models can be solved by using numerical solution methods that are based on Scarf's simplicial search algorithm [see, e.g., SCARF (1984)]. This solution method was introduced by SHOVEN AND WHALLEY (1972, 1973). These numerical models also facilitate the disaggregation of consumers and producers in more groups, and the analysis of the effects of tax systems with several taxes and subsidies. After the pioneering work by Shoven and Whalley a lot of numerical general equilibrium models were developed. For expository reasons, the numerical general equilibrium
models are split up in five categories.

The first category, comprises models that are based on the methodology that was also used in Harberger (1962). As in that paper, these models use a linearization method to solve the model. The linear approximation method that is used in the numerical models is derived from Johansen (1960). From the utility maximizing behavior of consumers and the profit maximizing behavior of producers, demand and supply functions for the different commodities are derived. The first derivative of these functions give the changes in demand and supply that occur if prices or income change. These differential equations are linearized around an initial steady state. A change in the tax policy leads to a change in the prices. The effects of this policy can then be determined with the differential equations. The tax revenues can either be used for the finance of public commodities or can be paid back to consumers or producers. Linearized models have been developed, for example, for the Dutch economy [cf. Keller (1980)] and for the Australian economy [cf. Dixon et al. (1982, 1984)], where the latter is a multi-purpose model that allows for an analysis of fiscal policies but is particularly used for the analysis of changes in tariffs, exchange rates and other import and export conditions. The models for several countries that are used at the World Bank for analyzing the effects of trade policies can also be categorized as linearized models [cf. Dervis et al. (1982) and Dixon et al. (1992)].

The advantage of the two-sector model of Harberger is that it can, in principle, be solved by hand. The models mentioned are, however, large-scale models, which were solved by using a computer. The linear structure of these models keeps the computation time relatively short. Linearized models are, therefore, open to a detailed description of several economic phenomena, while the required calculations are still manageable. The Australian model, for example, contains a detailed description of the labor market, where nine types of labor are distinguished, the agricultural sector, with seven different types of agricultural land, and the commodity markets, containing 230 commodities, where 115 commodities are produced in 113 domestic industries and 115 commodities are imported. A recent version of the Dutch model mentioned above contains 114 sectors and 65 goods [cf. Keller et al. (1988) and Cornielje and

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7 In Chapter 4 of this monograph, the nature of this method will be discussed. A more detailed discussion of this method is in Dixon et al. (1992). Apart from numerical models a linearization method is used in analytical models as well, not only in Harberger (1962) and the extensions thereof [see Mclure (1975) for a review], but also in more recent studies. In, e.g., Judd (1985a, 1985b, 1987), and Bovenberg (1986, 1989, 1993) a linearization method is used to obtain analytical results from a dynamic model.
ZEELENBERG (1991)]. A disadvantage of the linear models is that they are only appropriate for the analysis of small tax changes while they may cause serious misspecification if they are used for the analysis of large tax changes or tax reforms [cf. SCARF AND SHOVEN (1984)].

A second category of computable general equilibrium models concerns the models developed by the research group of Shoven and Whalley. These models are not linearized and are characterized by a rather ad hoc approach with respect to the dynamic decisionmaking of consumers. The basic model, as presented in BALLARD ET AL. (1985), will be discussed here. In the model nineteen production sectors are distinguished. Every production sector produces one commodity. Production not only requires labor and capital input, but also intermediate inputs, where the use of intermediate inputs is derived from a fixed-coefficient input-output matrix. A transition matrix transfers the nineteen producer goods into fifteen consumer goods. Consumers are split up in twelve income groups. Utility of consumers does not only depend on present consumption, but also on future consumption. Present consumption also contains leisure, which implies that labor supply is determined endogenously. The preferences for future consumption make that consumers save a part of their income.8 The saving decision does not follow from lifetime decisionmaking, but rather from a one period allocation of present income between present consumption and saving. It is assumed that saving is spent on a saving good that is a composite of the nineteen investments goods that are required in the nineteen production sectors. For each sector, investment purchases are a fixed proportion of the output.

The government supplies goods and services. Some of these goods are offered free of charge, while others are subject to user charges. The latter goods are produced in public enterprises. These public enterprises make up one of the nineteen production sectors. The supply of public goods that are free of charges depends on the demand for these goods. To determine this demand, it is assumed that the preferences for the freely offered public goods can be represented by a utility function of the government. The government maximizes this utility function as if it were a single consumer. Like the saving good, the public goods that are freely offered are assumed to be a composite of the nineteen producer goods. The use of labor that results from the maximization of the utility function of the government sets the number of public workers. For the finance of the public goods the government collects taxes. The government is not allowed to run deficits. PEREIRA (1991, 1994) relaxes this

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8 Savings are allowed to be negative.
assumption and derives the optimal provision of public goods and optimal government
deficits and surpluses from the maximization of an intertemporal utility function
subject to an intertemporal budget constraint. All major taxes of the United States are
incorporated in the standard model. Finally, the government makes redistributive
transfers to consumers. These transfers are assumed to be lump sum. Taxes, social
security benefits and premiums do not follow from the maximization of the utility
function of the government, but are, instead, exogenously determined from the U.S.
tax and social security system. The model is calibrated by using data for 1973. Only consumers take account of the future effects of their present decisions by setting
aside a part of their income for future consumption. However, while making their
savings decisions, consumers do not form expectations with respect to variables that
are important for this decision, like the interest rate, prices and income. The
assumption with respect to the dynamic decisions made by consumers makes that it
is not necessary to solve the model for all periods simultaneously, but that a sequential
solution method suffices.

A more rigorous treatment of dynamic decisionmaking is in the third category of
computable general equilibrium models that will be discussed. In this category models
are brought together that describe consumer behavior with the paradigm that was first
suggested by Ramsey (1928). This paradigm states that infinitely-lived consumers let
the intertemporal distribution of the revenues from their endowments depend on the
maximization of the present value of their lifetime utility. The first order conditions
from this maximization problem are rather easily determined, which makes it an
attractive approach for analytical models. The infinitely-lived consumer is, for
example, used in modern microfounded macroeconomics to study the optimal
intertemporal allocation of resources [cf. Blanchard and Fisher (1989)] as well as
in the endogenous growth theory [see Barro and Sala-i-Martin (1992, 1995), for
a review]. In an equilibrium setting, this approach is used by Sinn (1982), Judd

\footnote{A similar approach with respect to public consumption and taxation is adopted in Keller (1980).}

\footnote{The use of data from the U.S. implies that the model in Ballard et al. (1985) is a
model for the U.S. economy. A similar approach is used to model the economy of other
countries. See, for example, Piggott (1980) for Australia, Serra-Puche (1984) for Mexico
and Piggott and Whalley (1985) for the United Kingdom. In Borges and Goulder
(1984) a somewhat adapted model is used to analyze the impact on the U.S. economy of
changes in energy prices, while Whalley and Wiggle (1990) discuss the introduction of a
carbon tax in a related model.}
These papers give analytical results, where Judd and Bovenberg use a linearization method to obtain such results. Computable general equilibrium models that relate consumer behavior to an infinite horizon maximization problem are Goulder and Summers (1989) and Bovenberg and Goulder (1991). In the former paper not only consumers, but also producers face an infinite horizon objective. The producers' decisions with respect to investments and dividend payments are in accordance with the maximization of the value of the firm. This theory will be discussed in Chapter 4 of this monograph. With respect to government behavior it is assumed that taxes, transfers and government spending are exogenously determined. There is only one representative consumer, consuming seventeen commodities and no leisure. The number of production sectors is reduced to five. In this respect the model of Goulder and Summers (1989) is less detailed in comparison with Ballard et al. (1985). The model of Goulder and Summers allows for interindustry effects of tax policies. Bovenberg and Goulder (1991) introduce international capital mobility in the model.

A second dynamic approach that is used in computable general equilibrium modeling distinguishes different cohorts of consumers with finite lives. These overlapping generations models form the fourth category of models to be discussed. The standard reference is Auerbach and Kotlikoff (1987). In that study 55 cohorts are distinguished. Every cohort lives 55 periods, so that in every period 55 different cohorts are alive. Within a cohort, consumers are not further split up in different groups. Consumers have preferences with respect to a consumption good and leisure. It is assumed that all 55 cohorts supply labor. For the analysis of benefits for retirees it is, however, assumed that the ten oldest cohorts do not supply labor. To obtain differences in earnings between cohorts, a human capital profile is formulated that determines the earnings capacity of the representative individual of a cohort. On the production side, one sector is assumed, where the representative producer maximizes

11 An infinite horizon version of the overlapping generations model is obtained if gifts from young to old and bequest are introduced. It is assumed that consumers care for their ancestors and descendants, and that dynasties are infinitely lasting [cf. Barro (1974)]. See, for a critical assessment of these adaptations, Butter (1979). Blanchard (1985) transforms the overlapping generations model into a model where individuals have an infinite horizon and a constant probability of death throughout their live (perpetual youth) and shows that the Ramsey model, as described above, is a special case of this reformulated overlapping generations model. Bovenberg (1993) presents a general equilibrium model with perpetual youth.

12 Keuschnigg (1989) reduces the number of cohorts and the number of periods that individuals live, to two, while leaving the rest of the model structure as it is.
the value of the firm in order to determine the optimal investment strategy. Government spending is exogenously determined and are assumed to grow with the same rate as the population. To finance these expenditures, the government has taxes on all income, capital income, labor income or consumption at its disposal. The efficiency of the different taxes is analyzed. The government faces an intertemporal budget constraint. Deficits are bond financed. The social security system is of the pay-as-you-go type and self-financing. A qualitative calibration procedure is used to choose the values of the structural parameters. Due to the detailed description of the dynamic decisionmaking of consumers and producers, the effects of the timing of government policies and of the announcement of a policy can be analyzed with this overlapping generations model.

The computable general equilibrium models discussed thusfar use quantitative or qualitative calibration procedures to specify the values of the parameters. This is in contrast with macroeconomic modeling, where, in general, parameters are estimated with econometric methods. The choice of a calibration method is pragmatic, because the number of parameters in these models increase rapidly with the number of consumer groups and production sectors that are distinguished. Mansur and Whalley (1984) compare a calibration procedure with some econometric methods for a small equilibrium model and conclude that the methods lead to fairly similar results for preference weights and factor share parameters in utility and production functions, respectively. Although this suggests that calibration procedures are satisfactory to specify parameters and that the use of econometric methods is not a prerequisite, some models that are open to the use of econometric methods for the estimation of parameters, have been developed. These econometrically estimated models form the fifth category of computable general equilibrium models that are discussed in this section. Pioneering work in this area has been done by Jorgenson [cf. Jorgenson (1984) and Jorgenson and Yun (1986a)]. In this approach behavioral equations for consumers and producers are obtained from the dual problem. Indirect utility is specified as a function of prices, relative to expenditures, and some other attributes. From the aggregate indirect utility function, aggregate expenditure shares are determined for five commodity groups. The model does not distinguish between different consumer groups. The cost function contains the prices of capital, labor, energy and materials that are used as inputs. Time is inserted in the cost function as

\[13\] Substitution elasticities in a CES specification for utility or production cannot be calibrated with a benchmark data set. The values of these elasticities must, instead, be determined from other data sources, such as results that are found in other studies. See Mansur and Whalley (1984) for more details.
an index for technology. The production sector is divided into 35 industries. The functional forms that are chosen for the indirect utility and cost functions are of the translog type. The choice of this functional form is important for a successful application of econometric methods. The parameters in the equations that describe producer behavior are estimated separate from the parameters in the equations that describe consumer behavior.

JORGENSEN (1984) concentrates on the estimation procedure and does not offer details on equilibrium conditions, government behavior and the solution method. A complete computable general equilibrium model is presented in JORGENSEN AND YUN (1986a). The production block is, however, stripped down in this version from 35 industries to one aggregate sector. It produces two commodities, an investment good and a consumption good and uses only capital and labor as input factors. Adjustment costs related to investments are introduced in the model. Consumers supply labor, demand consumption goods and decide upon saving. They have an infinite horizon. The government levies taxes for the finance of her expenditures, which are given. A balanced budget is assumed. All important U.S. taxes are incorporated. The disaggregated model with 35 industries is used in JORGENSEN AND WILCOXEN (1990) for the analysis of different government policies to reduce carbon dioxide emissions. That paper also gives a detailed description of the consumption sector, where 672 types of households are distinguished.

1.2.3 Models with endogenous policies of a benevolent government

In the computable general equilibrium models that were discussed in the previous section, the values of the public sector variables are typically exogenously given. In this subsection some general equilibrium models will be discussed that allow policies to be endogenously determined by assuming a benevolent government, maximizing a social welfare function. In this respect a normative approach with respect to government behavior is followed since the own motivations of government policymakers are not addressed.

A benevolent government is present in the optimal taxation literature. In this literature, the government sets the tax rates equal to the values that lead, for a given tax system and for a given level of government spending, to the lowest loss in social welfare (or the lowest excess burden). As for optimal saving, Frank Ramsey was the first to publish about optimal taxation. His findings in RAMSEY (1927) regarding optimal commodity taxation remained on the shelf for years, until the publication of DIAMOND
The principal finding is that the commodity taxes are optimal if the reduction of the demand for the commodities is the same for all commodities. A popular version of this finding, that follows with some additional assumptions, is the inverse elasticity rule, that states that the ad valorem taxes (tax relative to price) should be proportionate to the inverse of the price elasticity of the demand for the goods. This implies that the highest tax should be on the commodity with the lowest price elasticity. MIRRLEES (1971) presents the conditions for an income tax to be optimal, while SHESHINSKI (1972) evaluates the linear income tax, consisting of a uniform marginal tax rate on income and a lump sum negative income tax. It follows from the latter paper that the conditions for the optimal income tax are somewhat similar to the conditions for commodity taxes to be optimal. The optimal income tax rate depends on the inverse of the price elasticity of labor supply and, furthermore, on a marginal measure of inequality and the optimal value of the lump sum.

In the above studies, the cross-price effects and income effects of the taxes were taken into account, while determining the optimal tax rates. In that respect these approaches differ from the partial equilibrium analyses, where these effects are neglected. What is, however, neglected in the studies discussed above, is that the introduction of taxes or a change in the tax rates has an effect on the equilibrium prices. The values of the optimal tax rates may be substantial different if these effects are taken into account. FELDSTEIN (1973) analyzes the general equilibrium effects for the linear income tax in a model with two types of consumers that have identical preferences but a different wage income. Taking account of general equilibrium effects leads to a higher optimal tax rate compared to the optimal tax rate when general equilibrium effects are neglected. The difference is, however, small. The conclusion that ignoring the general equilibrium effects leads to a bias in the results, but that this bias is rather small, is challenged in ALLEN (1982). It is shown in that paper that the small bias is due to the chosen production elasticity of substitution. The analytical results in ALLEN (1982) are determined for the introduction of a tax at a market equilibrium. CARRUTH (1982) analyzes the importance of the production elasticity of substitution in a more general setting and relaxes, in addition, the assumption of identical preferences. The numerical results in that paper support the findings in ALLEN (1982) that the optimal income tax depends on the relationship between the price elasticity of labor supply and the

production elasticity of substitution. The analyses of Feldstein, Allen and Carruth demonstrate the importance of a general equilibrium model, where not only the cross-price and income effects of tax policies are taken into consideration, but also the effect on equilibrium prices. As yet, the small general equilibrium models mentioned in this paragraph, appear to be the only models that incorporate social welfare functions to determine the tax rates.

The provision of public goods is a second issue that is studied in the normative literature. The optimal provision of public goods depends on the maximization of social welfare by the benevolent policymakers. The central result with respect to the provision of public goods is the Samuelson condition. This condition states that the provision of public goods is optimal if the sum of the marginal rates of substitution is equal to the marginal rate of transformation. In the absence of lump sum taxes, the finance of the public goods with distortionary taxes requires an adaptation of the Samuelson condition, however [see STIGLITZ AND DASGUPTA (1971) and ATKINSON AND STERN (1974)]. In that case, the government has to trade off the negative effect on social welfare of the distortionary taxes against the positive effects on social welfare. In the computable general equilibrium models that use a social welfare function, and that will be discussed in the remainder of this subsection, the weighing of these opposite effects is neglected. In these models, tax rates are assumed to be fixed and the tax revenues, depending on the tax rates and on the endogenously determined tax base, are distributed over the different public goods. In this respect, these models use the reverse approach of optimal taxation, where the optimal tax rates are determined to obtain sufficient tax revenues for the finance of a given amount of public expenditures.

In KELLER (1980), public goods are provided by the public household, that is regarded as one part of the government. The other part of the government is the fisc that collects taxes. The provision of the public goods follows from the maximization of the utility function of the public household, subject to a balanced budget condition. The utility function of the public household is explicitly derived from the utility functions of the private households, and can, therefore, be interpreted as a welfare function. The assumption that preferences are separable with respect to private and public goods causes the maximization of the utility of the public household to be independent of the preferences with respect to private goods. To determine the effects of a change in the tax system on private sector behavior, it is assumed that the tax change does not affect the utility of the public household. In BALLARD ET AL. (1985) and SERRA-PUCHE (1984) a similar approach is adopted for public goods that are offered free of charge,
except that the preferences of the public household are not explicitly derived from private preferences. The public household in PEREIRA (1991, 1994) differs from these studies in the intertemporal nature of the public utility function, which leads to an endogenously determined balance of the budget. The tax rates are determined exogenously, however.

1.2.4 Conclusion

Computable general equilibrium models are particularly used for the analysis of distributive and allocative effects of government policies. The models that were surveyed in this section were developed for the study of the effects of fiscal policies. For expository reasons, five types of models were distinguished. Main differences between the models are related to the extent of aggregation, functional forms and dynamics. Models that follow the approach that was developed in JOHANSON (1960), distinguish many consumer and producer groups. Dynamic aspects are neglected in almost all of these models. The linearization of the model reduces the computation time significantly. The computational advantage of these models diminishes, however, with the increasing computational power of computers. The cost of the computational ease is the misspecification that may occur if large policy changes are analyzed.

Dynamic aspects are more rigorously taken into account in the Ramsey and overlapping generations models. These theoretical descriptions of consumer behavior are also used in microfounded macroeconomics, although the latter miss the spill-over effects between markets.¹⁵ The models in these traditions also incorporate dynamic aspects on the production side. Producer decisions are in accordance with the maximization of the value of the firm. The careful description of dynamic aspects is motivated by the policy changes that are analyzed. These policy changes affect capital formation and/or savings. With respect to the latter, Auerbach and Kotlikoff (1987) note that in their overlapping generations models the response of savings on a change in the interest rate is much stronger than can be observed in reality. A similar conclusion is reached in Starrett (1988) for the Ramsey-model. Both types of models predict, in addition, that elderly will dissave, which does not seem to be in accordance with the actual behavior of the elderly. These observations suggest that the actual dynamic decisionmaking of consumers is poorly modeled by the standard...

¹⁵ Compare the discussion in Gordon (1990) on the differences between new-Keynesian and disequilibrium models.
Survey of relevant economic and political models

Ramsey and overlapping generations models. To get a better understanding of savings decisions, several suggestions are proposed to adapt the standard models, such as the introduction of subsistence levels in the utility function, big-ticket purchases, bequests and liquidity constraints [cf. STARRETT (1988)].

The computable general equilibrium method developed by Shoven, Whalley and their associates, treats savings in a rather different way. The assumption that savings does not follow from the maximization of life-time utility reduces the number of calculations to solve the model significantly. Other aspects can, in that case, be modeled in more detail. The model in BALLARD ET AL. (1985) contains, e.g., twelve consumer groups, whereas AUERBACH AND KOTLIKOFF (1987) as well as GOULDER AND SUMMERS (1989) do not distinguish different consumer groups within one generation. Compared to the Ramsey and overlapping generation models, the model of Shoven and Whalley is better equipped to analyze fiscal policies that have intragenerational effects. The inadequate theoretical underpinning of the consumers’ intertemporal decisionmaking makes this model, however, less attractive for the analysis of policies with intergenerational effects.

The model of Jorgenson and his associates is interesting for the feature that econometric methods can be used to estimate the parameters of the model. It allows, in addition, for the distinction of a number of consumer and producer groups, as well as for dynamic aspects. The incorporation of the functional forms that are used for the consumption and production functions in a model with a maximizing government leads to fairly complex calculations, though.

Computable general equilibrium models incorporating endogenous government behavior are rather scarce. These models typically address the optimal provision of public goods, determined by the maximization of a (ad hoc) postulated government utility or social welfare function [cf. KELLER (1980), SERRA-PUCHE (1984), BALLARD ET AL. (1985) and PEREIRA (1991, 1994)]. Tax rates are exogenously given, with the exception of one tax rate, that is determined by the balanced budget condition.
1.3 Political decisionmaking

1.3.1 Introduction

In this section some theories concerning political decisionmaking are discussed that start from the behavioral postulate that individuals are rational and selfish and that the decisions made by these individuals follow from the maximization of their utility. This postulate is common in economics for the behavior of private sector agents. Theories that use this postulate as a starting point for the behavior of public sector agents are classified as public choice theories [see, for a review, MUELLER (1989)]. In a representative democracy, political decisionmaking is influenced by the preferences of voters, individuals that are organized in interest groups, bureaucrats and politicians. In Subsection 1.3.2 theories of voter behavior are discussed. This subsection also pays attention to the median voter model, where political decisions are assumed to depend solely on the preferences of voters. In Subsection 1.3.3, theories that focus on interest groups and their impact on political decisionmaking are reviewed. Bureaucratic behavior is the subject of Subsection 1.3.4. Subsection 1.3.5 starts with the behavior of politicians and discusses the restrictions politicians face if they attempt to realize their own interests. Then, attention is paid to three approaches that derive political decisionmaking from behavioral assumptions of politicians. These approaches are the probabilistic voting approach, the interest function approach and the Leviathan approach. Subsection 1.3.6 compares the different approaches with respect to political decisionmaking.

1.3.2 Voters

In a direct democracy, political decisions are made by citizens eligible to vote, who directly vote on the public issues that are at stake. Rational selfish voters will vote for the alternative that promotes best their interests.¹⁶ In spatial voting theory this is visualized in a (n-dimensional) space [see, for a detailed introduction of this theory, ENELOW AND HINICH (1984)]. The voter’s most preferred policy can be represented by a point in this space, called the ideal point. It is sufficient for an ideal point to exist that preferences are single peaked, which presupposes either voting on a fixed budget or satiation of preferences. The latter assumption contrasts with the common premise

¹⁶ For the influence of emotions, in particular anxiety and enthusiasm, on voting decisions, see MARCUS AND MACKUEN (1993).
in economics that preferences are non-satiated [cf. SCHRAM (1989)]. A choice between two policy proposals, which can also be represented by a point in the space, is made by the voter by determining the (Euclidean) distance between the proposals and the ideal point. The policy proposal with the shortest distance to the ideal point will be chosen. If decisions are made by a majority rule, a policy will be chosen that lies closer to a majority of ideal points of the voters than any other policy. In case of decisionmaking on one issue, the space is a straight line and the ideal points of the different voters are represented by different points on this line. The policy alternative that lies closer to a majority of the ideal points than any other alternative is in that case equal to the ideal point of the median voter.\textsuperscript{17} Political decisions are, therefore, in accordance with the preferences of the median voter. This is the central idea behind the median voter theory, that is much applied in political economic studies that investigate the political decisionmaking process in real-life democracies. Most democracies are, however, of the representative instead of the direct type. In representative democracies voters do not vote for a single issue, but for a candidate that represents multiple issues. Application of the median voter theory, therefore, requires the existence of a decisive median voter in case of voting on multiple issues and, in addition, that the decisionmaking process in a representative democracy is well described by the median voter theory.

With respect to the extension of the median voter theory to multiple issues, it appears that this theory breaks down if it is applied to voting on more than one issue at a time. The policy alternative that has the shortest (Euclidean) distance to a majority of ideal points does not necessarily beat all other alternatives in a pairwise voting. That is, it is possible that there is an alternative policy that is preferred by a majority above the alternative with the shortest distance. It follows, in addition, that the outcome of an election with pairwise voting over the alternatives, depends on the sequence of the pairwise contests. The outcome can, therefore, be manipulated by the agenda setter(s), who decide(s) upon the pairwise voting sequence [cf. McKELVEY (1976, 1979)]. An alternative for the shortest distance is to search for a point that is a median in all directions. All hyperplanes that go through this point separate the voters in two equal groups. Although sufficient and necessary conditions can be given for such a point to exist, there is no guarantee that these conditions are fulfilled, and if these conditions are fulfilled, it is possible that more than one point exists that is median in all directions [cf. ENELOW AND HINICH (1984)].

\textsuperscript{17} Problems that may occur if there is an even number of voters, or if some voters have identical ideal points, are neglected here.
The second requirement for an appropriate application of the median voter theory is that it gives a description of the political decisionmaking in a representative democracy. In a representative democracy voters vote for political candidates. The voting decision depends then not only on policy issues, but also on some characteristics of the candidates, such as social and religious background, national and international reputation, honesty, public performance and the candidate’s health status. Following Enelow and Hinich (1984), these characteristics will be referred to as nonpolicy aspects. If the distance between voter i’s most preferred policy $y^0_i$, and the policy proposal of candidate $j$, $y_j$, is represented by $D_i(y^0_i, y_j)$, and the appreciation of candidate $j$’s characteristics are represented by $z_{ij}$, then the voter will choose for a candidate $k$ if

$$z_k - D_i(y^0_i, y_k) > z_j - D_i(y^0_i, y_j), \quad \text{for all other candidates } j$$ (1.1)

The policy aspects and nonpolicy aspects can be put together in one measure by the voter. This measure is called a utility function. Voter $i$ will choose candidate $k$, if this voter attaches a higher utility to the victory of candidate $k$ than to the victory of all other candidates

$$U_i(y_k, z_{ik}) > U_j(y_j, z_{ij}), \quad \text{for all other candidates } j$$ (1.2)

where $U_i$ refers to the utility function of voter $i$. The electoral outcome depends not only on the voter preferences, but also on the behavior of the political candidates. A discussion of this outcome is, therefore, left for Section 1.3.5, where the behavior of politicians will be discussed.

Thusfar, we did not bother whether people would cast a vote or abstain from voting. In most representative democracies there is no compulsory voting. In the absence of compulsory voting, individuals may abstain from voting. Two reasons are given for voters to abstain. A first reason for abstention is alienation. In spatial voting theory, a voter decides to abstain if the distance between the policy proposals of all political candidates that participate in the elections and the ideal point of the voter is so large that it is not attractive to vote. A second reason for abstention is indifference. Indifference occurs if the points that represent the different policy proposals have more or less the same distance to the ideal point of the voter. The extra benefits that the voter receives if the most favorite candidate wins the elections does not compensate the effort that he or she must make to cast the vote. The tradeoff between costs and benefits of casting a vote is not only present in the spatial theory of voting, but also in other theories of voting. Starting with the seminal analysis of Downs
(1957), it has been asserted that in large scale elections the expected benefits from voting are rather small and may easily be outweighed by the costs of casting the vote. Benefits are only present if the vote is decisive. The chance that a voter’s ballot is decisive is very low in large elections. A rational voter would in that case decide to abstain. This conclusion would lead to the prediction that almost all voters would abstain in large scale election, which is in contrast with the actual turnout in these elections.

A number of suggestions have been made to solve this voting paradox. Two elements come back in many of these suggestions. The first is that voters see participation in elections as a civic duty. The voter’s utility increases if this civic duty is fulfilled [cf. RIKER AND ORDESHOOK (1968)]. A second suggestion deals with social groups. The underlying view is that each individual is a member of a social group and that these members have identical interests. The probability that the members of a social group will vote depends on the chance that this social group is decisive [cf. PALFREY AND ROSENTHAL (1983) and LEDYARD (1984)]. Voters that see participation as a civic duty as well as voters that are a member of a social group may, however, still have a tendency to free ride. The problem of free riding is partly resolved in SCHRAM AND VAN WINDEN (1991), where the two above suggestions are brought together. Basically, the argument is that for some of the members of the social group, particularly opinion leaders, it is worthwhile to put pressure on the other members to vote. This peer pressure increases the probability that members of the social group will vote, due to the fact that they derive some utility from giving in to this pressure. Arguments that are used in exerting pressure refer not only to the voting behavior of the members of the own group, but also to the voting behavior of members of other groups. Group members that exert pressure may point to the expected high voter turnout of other social groups, whose members favor in general another candidate, to convince voters that their vote may be decisive. Pressure, therefore, not only depends on the intra-group relations but also on the inter-group relations.

In several studies factors that have a strong influence on the party choice of a voter are studied. A few will be discussed in the remainder of this subsection. Rational voters will choose for the policy proposal that maximizes their utility, or utility income, as it is called in DOWNS (1957). However, voters have limited information about the impact of political decisions on their utility income [cf. KRAMER (1971)].

\[\text{18 For further progress in this direction see, e.g., UHLANER (1989), GRAFSTEIN (1991) and MORTON (1991).}\]
Their party choice is, therefore, based on this limited information. Kramer states that voters will support the incumbent party if they find its performance in the past satisfactory, while a vote for the opposition party may be expected if voters are unsatisfied with the incumbent party's performance. The information that is used by the voters to evaluate this performance is, in Kramer's view, given by the development of macroeconomic variables. Kramer uses data for the presidential elections in the USA to test the relation between the number of votes that are caught by the incumbent party and the development of several economic variables. He finds that real income per capita has the strongest effect on the number of votes for the incumbent party. This result supports Kramer's view that the voter's evaluation of the performance of incumbent politicians is based on the (observable) impact of the politicians' policies on personal income [see also KRAMER (1983)]. A similar finding is in LEWIS-BECK (1989), where it is noticed that the voters' evaluation of the macroeconomic performance of the incumbent party depends on real disposable income (pocket money). Own income is, however, seen as an indicator for the macroeconomic development. Although the dependence of the voting decision on real disposable income is in line with DOWNS (1957), the reason why voters let their voting decision depend on this variable is different. In Downs' perspective, real disposable income is important for the voting decision, because it is related to the voter's utility, while Kramer and Lewis-Beck assert that voters regard the development of their own income also as an indicator for the development of the whole economy. MUELLER (1989) notes in this respect that there is substantial empirical support for the hypothesis that the voting decision depends on economic variables that refer to both the voter's personal economic interests and to the nation's economic situation.

A more general formulation of Kramer's view is presented in KIRCHGÄSSNER (1986), where it is noticed that the voters' evaluation of the economic policies is based on observable economic variables that influence their personal situation and that are regarded as controllable by the government. Inflation, the unemployment rate and, probably, real disposable income are, in Kirchgässner's view, economic variables that meet these conditions. Inflation and unemployment appear in a lot of studies that investigate the relation between politics and macroeconomics. These studies are further discussed in Sections 1.4.2 and 1.4.3.\footnote{In these studies, unemployment and inflation are related to each other by means of a Phillips curve or Lucas supply function (see Sections 1.4.2 and 1.4.3). STIGL (1973), therefore, mentions that a high degree of multicollinearity among these variables is very likely to occur. In addition, Stigler is not convinced that rational voters care for the development of macroeconomic variables that describe short-run fluctuations. A rational voter would instead...}
The studies mentioned above examine variables that are assumed to be important for all voters. However, voters or groups of voters differ in interests and may, therefore, evaluate the economic performance of incumbent politicians differently. The consequences of, e.g., an increase in unemployment differ between unskilled workers, skilled workers, capital owners and retirees. Because unskilled and lower skilled workers have a higher chance to become unemployed than professionals, it can be expected that they are more concerned about unemployment than members of other social groups. Hibbs (1979, 1982) finds empirical support for this view. The consequence of a different evaluation of the politicians’ economic performance among members of different social groups implies that the popularity of the candidates varies over the social groups. The probability that a voter of a social groups will vote for a particular candidate differs, therefore, from the probability that a voter from another social group will vote for this candidate. Empirical evidence for this view is given in Schram and Van Winden (1986) and Schram (1990), where a significant difference in party choice between members of different social groups is found. This suggests that the (social) group level is an adequate level to investigate the interrelation between political and economic developments.

1.3.3 Interest groups and political pressure

Individuals are not only able to influence political decisions through the formal channel of voting, that was discussed in the previous subsection, but also by more informal activities. The informal activities to influence political decisions will be referred to as political pressure. In the literature these informal activities have different labels, with often different connotations [cf. Potters (1992)]. As with voting, the impact of the political pressure of a single individual is mostly very small. To increase the impact of their political pressure, individuals with common interests may organize themselves in pressure groups or interest groups. Interest groups may also be formed by organizations or institutions, such as firms and unions. Recent surveys of different economic models of interest groups are Mitchell and Munger (1991), Potters and Van Winden (1996) and Austen-Smith (1997).

As a member of an interest group, a rational selfish individual would try to maximize its benefits with as little effort as necessary. These members have, therefore, a
temptation to free ride: they share in the benefits but leave the efforts to the other group members. In OLSON (1965) it is stated that a group can promote its interests more effectively if it can more easily detect free riding. The interest group can, e.g., sanction members who try to free ride. Free riding is in particular a problem in large interest groups. It is more difficult to monitor the behavior of members in large interest groups than in small ones, which makes the detection of free riding more problematic. From this observation Olson derives the conclusion that a small group can promote its interests more effectively than a large group.

Apart from the group size, the effectiveness of the produced political pressure depends on the resources the interest group is willing to spend on producing pressure. One particular type of spending by interest groups to influence the political process are campaign contributions [cf. WELCH (1980), KAU ET AL. (1982) and AUSTEN-SMITH (1987)]. It turns out that the most effective way of contributing to election campaigns depends on the purpose that underlies the financial support. An interest group that tries to influence the election outcome with its campaign contribution can best support only the political party that has, in the opinion of this interest group, the most favorable policy proposal. If, on the other hand, the interest group only tries to influence the outcome of a particular political issue, it is better to contribute to the campaigns of all parties. In the latter case an interest group contributes to the campaign funds in order to give a signal to the politicians, who may run the offices after the elections, that particular issues are important for (the members of) the interest group. Apart from campaign contributions, the signaling function of a financial contribution may lead to transfers from interest groups to political platforms through other channels. However, in most democratic countries the financial support of political platforms is limited by law.

Group size and spending of resources are analyzed simultaneously in BECKER (1983, 1985). The model presented in these papers distinguishes two interest groups that have different preferences with respect to the outcome of a political decision. The political decision is assumed to depend on the political pressure that is exerted by the two interest groups, where the effectiveness of political pressure depends on the spending of resources by an interest group and on the numerical strength of the group. With respect to the latter, Becker follows OLSON (1965) and assumes that smaller groups can exert pressure more effectively than large groups, because the free-riding problem is easier to solve for small interest groups. Furthermore, the behavior of the interest groups can be characterized as non-cooperative. Because the political decision depends on the expenditures of both interest groups, the non-cooperative behavior leads to a
Nash-Cournot equilibrium. The decision on expenditures on pressure of one group depends in a Nash-Cournot equilibrium on expenditures of the other group. An interest group that is able to produce political pressure more effectively than other interest groups increases the probability that its most preferred policy is chosen. Better control over free riding is one possibility to lower the costs. Another important aspect that increases the probability that the most preferred policy of an interest group is chosen, is the social cost or benefit of the proposal that is supported by the interest group. If an interest group benefits from a political outcome, but the social costs of this outcome are high, this outcome will not be chosen, due to the counter pressure that these costs induce. Becker concludes that the competition among interest groups has a positive effect on the welfare of a society. This conclusion is in contrast with the widely spread negative view of interest groups, because they are held responsible for a sluggish economic growth and, therefore, a welfare loss [cf. Olson (1982)]. According to Becker, this condemnation is only justified if interest groups have a highly unequal access to political influence.

In Becker (1983, 1985) the governmental decisionmaking process itself and the process of producing pressure is left as a black box. If members of an interest group are rational and selfish, they will try to influence government decisions for their own benefits. Rational policymakers foresee the reason why interest groups are trying to influence their decisions. Is there room for interest groups in a world with rational and selfish individuals? It turns out that there is a rationale for political pressure, if the influence process is regarded as a process of information transmission [cf. Austen-Smith (1990, 1993), Potters and Van Winden (1990), Austen-Smith and Wright (1992) and Ainsworth (1993)]. Interest groups may have private knowledge that is important for government decisions. Lobbying or political pressure is, in this interpretation, seen as sending a message to policymakers with information that may be relevant for policymakers. AUSTEN-SMITH (1990) assumes that the transmission of information is self-enforcing and that sending a message is costless, while POTTERS AND VAN WINDEN (1990) investigate the political influence process when messages are costly. The presence of costs makes that sending a message is a signal in itself. An interest group that is willing to make costs to influence a government decision indicates that it finds the outcome of the decision important. The fact that a costly message is sent, appears to be more important for the effectiveness of political

20 The presence of asymmetric information makes that the political influence process can be modeled as a signaling game. A detailed discussion of these games is beyond the scope of this monograph. See, e.g., Kreps (1990) for an introduction to signaling games and Potters (1992) for details on modeling political influence as a signaling game.
pressure than the content of the message. Moreover, it is important for the reputation of the interest group that it carries out a threat or promise, if a threat or promise is part of the message. The effectiveness of political pressure and its effect on social welfare depend not only on the costs of the message (relative to the benefits) and the reputation of the interest group, but also on the prior beliefs of the government and on the similarity of interests between the proposal of the government and the interest group. The latter requirement explains why interest groups may prefer to lobby policymakers with similar interests.

The empirical literature with respect to lobbying by interest groups is reviewed by Potters and Sloof (1996). They conclude that campaign contributions and lobbying affect the behavior of politicians. Interest groups with a larger organized membership and a larger budget are more successful, while the presence of an oppositional group has a negative effect on this success. They, furthermore, find that corporate groups tend to contribute to the campaign of all parties in order to influence the parties’ positions, special interest (or ideological) groups support like-minded parties and labor groups have an intermediate strategy. The success of special interest groups is negatively affected if there is a strong electoral pressure on the incumbent party and the voters are well-informed. However, it cannot be unambiguously concluded from these empirical studies that a specific type of interest groups is particularly successful. For the models to be presented in this monograph it is of interest to add that empirical analyses in Renaud (1989), Schram (1989) and Van Velthoven (1989) suggest that social groups representing economic positions in the production process (like labor and capital) are important.

1.3.4 Bureaucrats

A social group, that is of particular interest for the decisionmaking process, is formed by the public sector workers or bureaucrats. They not only have a different voting preference than others [cf. Frey and Pommerehne (1982) and Schram and Van Winden (1986)], but they have also more opportunities to influence political outcomes directly, because they are involved with the design as well as the implementation of public policies. An influential study of how rational bureaucrats deal with these opportunities is Niskanen (1971). Interests that bureaucrats try to realize while in office have, e.g., to do with their salary, status, output of their bureau, size of their bureau and leisure on the job. These interests are related to the budget that bureaucrats receive. Niskanen, therefore, hypothesizes that bureaucrats will be interested in the
maximization of their budget.

According to Niskanen, bureaucrats are able to demand a budget that is higher than necessary for an efficient implementation of their activities, because of an asymmetry in information. Politicians are interested in the output and the costs of the bureaus, but the output is often difficult to measure, while the necessary costs are often difficult to uncover. In addition to the problem of directly monitoring the output and costs, the presence of a bilateral monopoly enables the bureaucrats to enlarge their budgets. Bureaucratic offices are almost by definition a monopoly. The frequent absence of competing producers leads to inefficiency, that is difficult to measure, because the controlling institution lacks information about production from other sources.

Basically, the monitoring problem results from the fact that bureaucrats have information about their activities and about the costs of these activities that is hidden for the politicians. Politicians can design regulatory mechanisms to obtain this private information. It may, however, be optimal for politicians to leave some discretionary power to the bureaucrats, instead of designing a mandate that gives precise instructions to the bureaucrats [cf. LAFFONT AND TIROLE (1993, Ch. 15)].

1.3.5 Politicians

The use of the assumption of rationality for the description of the behavior of politicians implies that public choice asserts that politicians try to realize their own interests, just like other individuals try to do. However, in trying to realize their own interests, politicians are restricted by institutional constraints. They can, for example, only realize their own interests if they are in office. In a representative democracy, (re-)election is a prerequisite for politicians to get (or stay) in office. Therefore,

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21 See, for a review of the literature on this subject, SAPPINGTON AND STIGLITZ (1987) and LAFFONT AND TIROLE (1993). Attention is, in particular, paid to regulatory mechanisms for public firms or private firms with monopoly power, where the government is assumed to be a benevolent regulator. The structure is more complex in LAFFONT AND TIROLE (1993, Ch. 11), where benevolent politicians (the Congress) monitor self-interested bureaucrats with private information. The bureaucrats have regulatory power over a firm and can be bribed by interest groups with interests opposite to the regulated firm.

22 The suggestion that a democracy could prevent politicians from only taking care of their own interests, is already in DE SPINOZA (1670). Also John Stuart Mill recognizes the importance of institutions in this respect, where he notes that "The very principle of constitutional government requires it to be assumed that political power will be abused to
politicians are competing for the votes of the citizens. The competition for votes implies that politicians have to take account of the interests of the voters. Politicians must, in addition, take account of the interests of bureaucrats, for bureaucrats are employed for the implementation of policies. In such a set-up, the government is not seen as a black box, but as an institution that is made up of individuals (politicians and bureaucrats). This approach was first discussed extensively in Downs (1957).

Following Downs, the spatial theory of voting pays attention to the relation between the interests of voters and political decisionmaking in a representative democracy. It was noticed in Section 1.3.2 that a voter would vote for the candidate that gives him or her the highest utility when elected [see eq. (1.2)]. To determine how many people will vote for a particular candidate, the voters are split up in different interest groups. The members of an interest group are assumed to have an identical ideal point, \( y^0_j \), and identical perceptions of the positions of the candidates’ proposals with respect to the policy issues. They differ, however, in valuing the nonpolicy aspects of the candidates, \( z_y \), where \( j \) refers to a particular candidate. Assume that there are two candidates, \( k \) and \( l \). Rearranging eq. (1.1) then gives that voter \( i \) will vote for candidate \( k \) if

\[
z_{ik} - z_{il} > D_i(y^0_i, y^0_k) - D_i(y^0_i, y^0_l)
\]

(1.3)

Voter \( i \) chooses candidate \( k \) if the nonpolicy value difference between \( k \) and \( l \), \( z_{ik} - z_{il} \), is greater than the policy value difference, \( D_i(y^0_i, y^0_k) - D_i(y^0_i, y^0_l) \). In Enelow and Hinich (1982), it is assumed that the ideal points of the voters (representing their position with respect to policy issues) are known to the candidates, but that the candidates are uncertain about the voters attitude towards nonpolicy issues. Candidates know, however, the distribution of the nonpolicy value difference over the group members of the different interest groups. Because of the introduction of uncertainty, this extension of the original electoral competition model is often referred to as the
probabilistic voting model. If it is, furthermore, assumed that voters do not abstain, it can be calculated how many members of each interest group will vote for a candidate if the policy proposals of candidates \( k \) and \( l \) are equal to \( y_k \) and \( y_l \) respectively. If the numerical strength of interest group \( s \) is equal to \( N_s \), and the proportion of members of interest group \( s \) that will vote for candidate \( k \) at given policy proposals \( y_k \) and \( y_l \), is equal to \( p_{sk} \), then the expected number of votes that will be obtained by candidate \( k \) is equal to

\[
Q_k(y_k, y_l) = \sum_{s=1}^{S} p_{sk} N_s \tag{1.4}
\]

where \( Q_k(y_k, y_l) \) refers to the total number of votes that candidate \( k \) obtains if candidates \( k \) and \( l \) propose the policies \( y_k \) and \( y_l \), respectively. The aim of political candidates is to become (re-)elected, which induces the candidates, under some additional assumptions, to maximize the number of votes [cf. ARANSON ET AL. (1974), COUGHLIN AND NITZAN (1981) and ENelow AND HINICH (1982)]. Suppose that the candidates have to choose their policy proposals simultaneously. It can then be shown that there exists a unique location \( y^* \) that is optimal for both candidates. That is

\[
Q_k(y^*, y^*) > Q_k(y_i, y^*) > Q_k(y^*, y_i), \quad \forall y_i \neq y^*, y_l \neq y^* \tag{1.5}
\]

The first inequality states that, given the choice of proposal \( y^* \) by candidate \( k \), candidate \( k \) will attain the lowest number of votes if candidate \( l \) chooses also proposal \( y^* \); if \( k \) chooses \( y^*, \ y^* \) is also the optimal choice for candidate \( l \). The second inequality states that, given the choice of proposal \( y^* \) by candidate \( l \), candidate \( k \) will get the highest number of votes if he or she chooses also proposal \( y^* \); if \( l \) chooses \( y^*, \ y^* \) is also the optimal choice for candidate \( k \). It follows from eq. (1.5) that the candidate...
who does not choose policy proposal $y^*$, will be beaten in the election by the other candidate. Therefore, the vote maximizing candidates will propose the same policy $y^*$. Note that the optimal policy proposal is not necessarily equal to the median voter’s ideal point. This is due to the fact that voter decisions not only depend on policy issues, but also on nonpolicy issues. It also turns out that interest groups with members that care less for nonpolicy issues are able to shift the optimal location of the candidates to their own most preferred point. The influence on the policy outcomes is, therefore, greater for interest groups that are not interested in nonpolicy matters.

A similar type of model appears in another strand of literature which is often referred to as the economic theory of voting [cf. FAIR (1978), BOROOAH AND VAN DER PLOEG (1983), LEDYARD (1984)]. In this literature voters are usually not considered as members of social groups. In these models, nonpolicy value differences between candidates are assumed to have a distribution over the whole voter population, which is known by the candidates. Interest groups are introduced in COUGHLIN AND NITZAN (1981) and LINDBECK AND WEIBULL (1987). The probability that a member of an interest group votes for a candidate then follows from the distribution of the nonpolicy value difference over the interest group, which is similar to the outcome of the spatial voting theory that was presented above. The objective of the candidates is, therefore, equal to the maximization of the (expected) number of votes [cf. eq. (1.4)]. In COUGHLIN ET AL. (1990b), an interesting consequence of this objective is given. Assume that the utility from policy issues is equal for all members of an interest group if a particular candidate is in office, and let this utility be denoted by $U_{sk}$ ($U_{sl}$) for a (representative) individual of interest group $s$ if candidate $k$ ($l$) is in office. The condition for member $i$ of interest group $s$ to vote for candidate $k$ is, analogous to eq. (1.3),

$$z_{ist} - z_{isk} < U_{sk}(y_k) - U_{st}(y_l)$$

(1.6)

Assume that both candidates believe that for each voter of interest group $s$, the bias in the nonpolicy value difference $z_{ist} - z_{isk}$ is uniformly distributed over some real interval $(\eta_s^l, \eta_s^l)$ [cf. FAIR (1978) and BOROOAH AND VAN DER PLOEG (1983)]. The probability $p_{sk}$ that a member $i$ of interest group $s$ votes for candidate $k$, as perceived by this candidate (which equals the probability $p_{sk}$ that all members of $s$ vote

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26 See BOROOAH AND VAN DER PLOEG (1983) for the results if a bell-shaped distribution (the Weibull distribution) for the bias is used.
for \( k \), then equals\(^{27}\)

\[
p_{st} = p_{tsk} = \text{Prob}[ z_{sti} - z_{sts} < U_{st}(y_k) - U_{st}(y_t) ]
\]

\[
= \frac{U_{st}(y_k) - U_{st}(y_t) - \eta_t'}{\eta_t' - \eta_s'}, \quad \eta_t' < U_{st}(y_k) - U_{st}(y_t) < \eta_t'
\]  

(1.7)

The number of votes that candidate \( k \) expects to obtain can be represented in the same way as was done for the spatial voting model in eq. (1.4). Assuming that candidates try to maximize the expected number of votes, it follows from eqs. (1.4) and (1.7) that candidate \( k \) maximizes

\[
\sum_{i=1}^{S} \mu_i U_{st}(y_k), \quad \text{with} \quad \mu_i = \frac{N_i}{\eta_t' - \eta_s'}
\]  

(1.8)

where constants (parts that do not contain \( k \)'s decision variable \( y_k \)) are omitted. For candidate \( l \) a similar objective results. Using eq. (1.5) it follows, again, for the optimal policies of candidates that \( y_k = y_t = y^* \). Eq. (1.8) states that vote maximizing political candidates will maximize the weighted sum of the utilities of the (representative) individuals of the interest groups. The weights depend on the numerical strength of the interest groups, \( N_i \), and on the homogeneity of the group, which is represented by the density \( 1/(\eta_t' - \eta_s') \). Candidates, thus, attach a higher weight to interest groups that are large and/or homogeneous. Large or homogenous interest groups have, therefore, a stronger influence on the government policies than small or heterogeneous interest groups.

A similar objective as eq. (1.8) is suggested by the interest function approach, developed in VAN WINDEN (1983). In this approach, also bureaucrats come in. Politicians, in furthering their own interests, are constrained by political and economic institutions, on the one hand, and the reactions of social groups (including bureaucrats), on the other. Social groups try to influence the political decisions in a way that the political outcomes are more beneficial for them. They can do this as

\(^{27}\) Note that \( p_{st} = 1 \) if \( |U_{st}(y_k) - U_{st}(y_t)| > \eta_t' \) (all members of group \( s \) will vote for candidate \( k \), if the difference between the utility obtained from the policies proposed by \( k \) and \( l \), is greater than \( \eta_t' \)), and \( p_{st} = 0 \) if \( |U_{st}(y_k) - U_{st}(y_t)| < \eta_t' \).
voters or, as a member of an (organized) interest group. These reactions force politicians to take account of the interests of these groups. In Van Winden (1983), it is argued that politicians take in particular account of social economic groups, having a specific position with respect to production in society (particularly capital owners, private sector workers, public sector workers and dependents). Empirical support for the political significance of these groups, in and outside elections is in Renaud (1989), Schram (1989) and Van Velthoven (1989).

The attention that politicians have to pay to the interests of (other) social groups implies that their objective not only consists of their own interests but also of the interests of other social groups. This is represented by a weighted representation of the interests of different social groups. The objective is referred to as the (complex) interest function of the government, or the political interest function for short. In Van Winden (1983) the political interest function has the Nash-form. Representing the interests of social groups by the utility of a representative individual of the social group, the political interest function yields

\[ P = \prod_{s=1}^{S} U_s(y)^{\alpha} \]

(1.9)

Note the similarity with eq. (1.8) that follows from the economic theory of voting. However, whereas the political decisions in that theory follow from electoral competition, the interest function approach also takes account of other influence mechanisms. Consequently, the influence weights in eq. (1.9) depend not only on the numerical strength and homogeneity of the interest groups, but also on the lobby activities of the social groups on political decisionmaking. A similar result as in eq. (1.9) was found by Grossman and Helpman (1994, 1996a), who used the menu auction theory of Bernheim and Winston (1986) to study the influence of lobby activities on political decisionmaking.

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28 Although the probabilistic voting models introduce interests groups, the members of these interest groups are only regarded as voters. Although the influence of an interest group depends in probabilistic voting theory not only on the numerical strength (the number of voters) but also on the group coherence, the interest groups do not try to influence the political decisionmaking process by other means than the voting power of their members. Interest groups are, thus, only introduced to distinguish voters with different political preferences. Exceptions are, e.g., Austen-Smith (1987) and Baron (1994), where an electoral competition model is presented with interest groups that try to influence the choice of (uninformed) voters by means of campaign contributions, and Grossman and Helpman (1996a), where campaign contributions also affect the positions of the political parties.
The theories discussed in this section all assert that politicians are constrained by the interests of voters and interest groups in promoting their own interests. If these constraints are not strong enough, politicians will neglect the interests of voters and interest groups and only take account of their own interests. The consequences of such a state of affairs is analyzed in Brennan and Buchanan (1980). Their Leviathan government is assumed to maximize tax revenues, given the existing tax institution. To combat this Leviathan, additional institutional constraints are required. According to Brennan and Buchanan, the power of incumbent politicians to maximize revenues can only be effectively limited by setting constitutional constraints on their opportunities to tax citizens, raise public debt and print money. The empirical support for a Leviathan government is weak. After reviewing the empirical studies on the Leviathan model, Mueller (1989, p. 271) concludes: "As so often happens in the social sciences, a bold new theory loses much of its shine as it is dragged through the muddy waters of empirical analysis". Notwithstanding the loss of its shine, the concept of the government as a Leviathan resounds in the American political debate on constitutional constraints for running public debt.

1.3.6 Conclusion

In this section, four approaches with respect to the modeling of political decisionmaking were discussed. The first approach is the median voter theory, where political decisions are determined by the preferences of the voter with the median income. As noticed in Section 1.3.2, this approach breaks down if decisionmaking concerns more than one issue. The approach gives, furthermore, a poor description of the decisionmaking process in a representative democracy. Grossman and Helpman (1996b, p. 3), note in this respect that "the median-voter model (....) misses important aspects of the political process in representative democracies. In particular, it neglects the fact that some groups often are favored by the political process relative to others, and that coalitions of voters often take further political actions beyond voting in order to influence policy". The second approach discussed is the probabilistic voting theory, where parties compete for votes. Voter decisions depend on the voter preferences with respect to policy issues and nonpolicy issues. In some probabilistic voting models, the electorate is divided into several interest groups. Policies are in these models determined by the maximization of a weighed sum of the utilities of representative individuals of the different groups. The weights depend on the numerical strengths of the groups and the group coherence. Political decisions depend in this approach on the behavior of voters and politicians. In the third
approach, the interest function approach, political decisions are also determined by the maximization of a weighted sum of the utilities of representative individuals of interest groups, but here the political influence weights also depend on the lobbying and pressure activities of the interest groups. The fourth approach is the Leviathan model, where democratic constraints on the behavior of politicians fail and the selfish politicians are seeking to maximize revenues.

The probabilistic voting approach and the interest function approach are more appealing than the median voter approach and the Leviathan approach, because their theoretical basis seems more accurate. However, since the probabilistic voting theory neglects the influence of interest groups (including bureaucrats) on the political decision process,\(^{29}\) the interest function approach will be used in the next chapters to describe the political decision-making process.

1.4 Government behavior in macroeconomic models

1.4.1 Introduction

The incorporation of policy goals in macroeconomic models dates back to the seminal study of Tinbergen (1952). Macroeconomists are in particular interested in the trade-off between inflation and unemployment, although some other economic variables may enter the objective function. Many of these models start from a normative perspective. These models will not be discussed here. In this section attention will be concentrated on some positive models. Subsection 1.4.2 starts with the political business cycle theory, which argues that incumbent politicians will try to manipulate macroeconomic development to boost popularity just before elections. This view is challenged by the so-called partisan theory, which asserts that policies are in accordance with the ideology of the incumbent political party. A third theory to be discussed combines these two approaches and argues that incumbent politicians will try to increase their popularity if they face a popularity deficit and run policies that are in accordance with their ideology if they are sufficiently popular to become re-elected. Most of these models take only two macroeconomic variables into consideration: unemployment and inflation. The macroeconomic model links these variables by way of a Phillips curve. In these models voters are assumed to be myopic, which gives politicians the opportunity to do the same trick in every election year. Subsection 1.4.3 discusses the

\(^{29}\) See the previous footnote for exceptions.
literature that considers voters as rational individuals that cannot be fooled every time. Taking account of the Lucas critique, individuals are supposed to form expectations with respect to inflation. The economic model is given by either an expectations augmented Phillips curve or a Lucas supply curve, linking surprise inflation (difference between actual price level and expected price level) with employment or output. Subsection 1.4.4 discusses some models that integrate the interest function approach with a macroeconomic model. Subsection 1.4.5 concludes.

1.4.2 Macroeconomic performance, elections and ideology

It was recognized in Section 1.3.5 that (re-)election is an important prerequisite for politicians for realizing their interests. The electoral performance of political candidates depends on their popularity, while their popularity depends on the utility that voters receive from their policies. A number of studies state that the macroeconomic performance of the incumbent candidate affects the voter's electoral decision. The relation between macroeconomic performance and the electoral decision of voters was discussed in Section 1.3.2. The literature discussed in that section focused on the effects of economic performance on the decision of the voters how to vote and the consequent popularity of the candidates. In this section some studies will be discussed that pay, in addition, attention to the impact of political decisions on the economic performance. The relevant literature is surveyed in, e.g., PALDAM (1981, 1997), BOROOAH AND VAN DER PLOEG (1983) and SCHNEIDER AND FREY (1988).

Incumbent politicians that wish to be re-elected, can use political instruments to influence the voting decisions. In NORDHAUS (1975), it is assumed that inflation and unemployment are arguments in the voter's utility function. The popularity of the incumbent politicians depends, therefore, on the development of these two macroeconomic variables, where popularity increases if inflation and unemployment decrease. The politicians that are in office will try to manipulate the values of these variables in a way that increases their popularity. The government can control the unemployment rate, while inflation cannot be controlled directly. However, the presence of a Phillips curve enables the government to manipulate the inflation rate indirectly. After politicians are elected and start their administration, they let the unemployment rate increase, which reduces inflation. When the administration term

30 The macroeconomic model, thus, consists of one equation, the Phillips curve, which shows a negative relation between inflation and unemployment.
comes to an end and new elections arise, politicians will reduce unemployment. The increase in inflation occurs just before or just after the election, depending on the rapidity of price adjustments. Voters are assumed to be myopic and do, therefore, not foresee that lower unemployment will lead to a higher inflation in the future. The low rates of unemployment and inflation just before the elections have a positive effect on the popularity of the incumbent politicians. The result of this policy is that a cycle in inflation and unemployment occurs, where unemployment increases when a new administration has started and decreases if new elections are imminent, and inflation first increases, then decreases and again increases around the new election. This cycle in economic performance is referred to as a political business cycle. Although some empirical studies find support for the political business cycle theory [cf. NORDHAUS (1975) and LANEY AND WILLET (1983)], the evidence against it seems to be much stronger [PALDAM (1981), BECK (1982a, 1982b) and HIBBS (1987)].

In contrast with the assumption that economic policies have the intention to increase the popularity of the incumbent politicians, HIBBS (1977), argues that economic policies depend upon the ideology of the incumbent politicians. The reason that politicians try to realize ideological goals is that the ideological goals are either in accordance with their own interests or with the interests of the people that voted for them. Hibbs also assumes that voters are myopic and that the main economic mechanisms can be captured by the Phillips curve. This so-called partisan theory predicts that a change in the color of the administration leads to a change in economic policy. Hibbs has tested the hypothesis that left-wing parties or coalitions have an ideological bias towards reducing unemployment at the cost of a higher inflation rate. He finds support for this hypothesis from data of twelve Western democracies. Further empirical support is given in, e.g., BECK (1982c) and POWELL AND WHITTEN (1993).

The electoral and ideological arguments are combined in a number of papers by Frey and Schneider [see also FREY AND LAU (1968)]. In the Frey-Schneider approach, politicians aim to increase their popularity if it is low, compared to the popularity of the competing candidates. If popularity is sufficiently high or if elections are not near,

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31 See the next subsection for a less restrictive assumption with respect to the voters' knowledge about the working of the economy.

32 To evaluate the policy proposals, voters must have a theory of the economy. ROEMER (1994) presents a model where candidates announce a policy and a theory of the economy. In such a setting, candidates can use ideological views with respect to the working of the economy strategically.
Survey of relevant economic and political models

politicians opt for policies that are ideologically driven. Apart from the development of some economic variables, popularity depends on nonpolicy issues (compare Sections 1.3.2 and 1.3.5). These nonpolicy issues are reflected by some personality factors of the incumbent politicians. In addition to the nonpolicy issues, the Frey-Schneider model introduces two other extensions. First, the influence of bureaucrats on government decisions enters the model by way of an administrative constraint. Second, whereas the political business cycle theory and the partisan theory do not describe the relation between government policies and unemployment, Frey and Schneider introduce policy variables and make the relation between government policies and economic variables more explicit. This relation is referred to as the economic constraint. Government decisions with respect to the policy variables are represented by a so-called reaction function, which contains the popularity constraint, the administrative constraint and the economic constraint.

The Frey-Schneider model predicts that government decisions are in accordance with the ideology of the incumbent politicians, unless there is a popularity deficit. In most of the empirical applications of this model, popularity depends on inflation, unemployment and, in some applications, the growth of disposable income. The economic constraint is of the Keynesian type and entails that unemployment decreases and disposable income increases if the government increases its expenditures. Politicians who face a popularity deficit will, therefore, undertake an expansionary policy. With respect to ideology, Frey and Schneider assume that left-wing politicians prefer to raise the government budget, while right-wing politicians prefer a decrease in public expenditures. The ideological policy of a left-wing party is, thus, similar with the policy politicians undertake if they want to increase their popularity. The reason why voters will vote for the right-wing politicians is in that case unclear [cf. Ahmed (1983)]. Frey and Schneider have tested their model for several countries [see, e.g., Frey and Schneider (1978b) and Schneider and Frey (1983) for applications to the United States and Frey and Schneider (1978a, 1981) for applications to the United Kingdom]. The empirical results seem quite convincing. Other studies give, however, less convincing results [cf. Neck (1982) for Austria, Ahmed (1983) for the United States and Renaud and Van Winden (1987) for the Netherlands].

The studies discussed so far, use a fairly small economic model. In Frey and Schneider (1979) the political model is integrated in an econometric model for (West-)Germany. The ex post forecasts of this politico-economic model are compared with the forecast of the pure economic model. It appears that the politico-economic
yields better forecasts than the pure economic model in almost every period. A similar approach is applied in Jongbloed (1991), where the Frey-Schneider model is integrated in an econometric model for the Dutch economy.

1.4.3 Macroeconomic policies and credibility

In a dynamic setting, the government may announce a policy that holds also for future periods. Economic agents let their intertemporal decisions depend on, for example, savings and investments depend on the policy that is announced by the government in a particular period. After a few periods, there may, however, be another policy that is more optimal for the government than the announced policy. In that case, the government may decide to deviate from the announced policy and replace it by the more optimal policy. Suppose, for example, that the government announces in the first period of a two-period situation that it will only tax labor income and exempt capital income from taxation in both periods. Consumers can decide in the first period whether they spend their income on consumption or invest in capital, and in the second period how much labor they will supply. The decision depends on the tax policy for the two periods that the government announces. The exemption of capital income has a positive influence on investment, while the tax on labor income has a negative effect on labor supply in the second period. In the second period, after the consumers have decided to invest a part of their income, the government will have the temptation to tax capital income and to reduce the tax on labor income, because this does not distort the investments, while it has a positive effect on labor income. In an economy with rational agents, the agents will foresee that the government will renege in the second period and they will take this into account while making their decisions in the first period. The policy that was announced by the government is in that case time inconsistent or not credible.

The time inconsistency of public policies was formalized in Kydland and Prescott (1977), followed by a more straightforward exposition in Barro and Gordon (1983). In these papers, attention is focused on monetary policies. The government has an objective function that involves inflation and (un)employment. Private sector agents (e.g., organized in a trade union) try to maximize the wage bill. The government sets the inflation rate, while private sector agents set the nominal wage rate. Voters are assumed to be rational. Rationality refers to the knowledge that voters

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33 Persson and Tabellini (1990) survey the literature on time inconsistency.
have about economic mechanisms. This implies that the incumbent party cannot fool the voters with a low unemployment rate just before the elections, because the voters know that this will lead to an increase in inflation after the elections. The relation between inflation and employment follows from an expectation-augmented Phillips curve, where employment is a function of surprise inflation. The private sector agents let the wage rate depend on the inflation rate they expect that the government will set in the next period. It follows that it is optimal for the government to announce an inflation rate that is equal to zero. After the private sector has determined the nominal wage rate, it is interesting for the government to depart from the announced inflation rate, because a higher inflation rate reduces the real wage rate. The zero inflation rate is, thus, not credible because the government has the incentive to surprise the private sector with a positive inflation rate. Credibility leads to an additional constraint on the monetary policies the government can choose.

The objective function of the government used in Kydland and Prescott (1977) and Barro and Gordon (1983), that weighs inflation against unemployment, is of the normative type. A more positive approach with respect to government behavior is in Cukierman and Meltzer (1986), Rogoff and Sibert (1988) and Rogoff (1990), where the objective function for the government depends on voters' preferences. In these studies, government decisions depend on the maximization of popularity by the incumbent party. The preferences of voters, and, as a consequence, of the political candidates, depend on inflation and unemployment. The political candidates have different political abilities. Private agents can influence government decisions by voting, but they have imperfect information about the competence of the candidates. The beliefs of the voters with respect to the (future) competence of the incumbent candidate depends on the previous policy performance. The asymmetry of information between voters and candidates gives the incumbent candidate an incentive

The expectation augmented Phillips curve differs in two respects from the original Phillips curve. First, the original Phillips curve lacks a microfoundation. The discussion on the microfoundation of the Phillips curve led to the conclusion that unemployment does not depend on inflation, but on surprise inflation, the difference between the actual price level and the expected price level [cf. Phelps (1970)]. Second, the new classical presumption that equilibrium on the labor market is the natural situation, replaces the Keynesian view that price rigidities lead to market distortions. Because the new classical postulate, that became dominant in the eighties, assumes away unemployment, unemployment is replaced by the level of employment in the augmented Phillips curve. The Lucas supply function replaces employment for output. This does not alter the relation between monetary and real variables, however.
to increase the budget before elections in order to make the voters believe he or she is competent, which is in line with the traditional theory on political business cycles. Because voters are considered as rational individuals, this literature is captured under the heading rational political business cycle theory.

In the three studies that were discussed in the previous paragraph, the candidates seek to stay in office. In ALESINA (1987) candidates are assumed to be representatives of political parties. These political parties have different ideologies, which leads to a different weighing of unemployment (and the related output growth) and inflation in the objective function. The rate of growth depends on inflation and on the growth rate of the nominal wage. The nominal wage rate is set by wage-setters and depends on expected inflation, whereas the incumbent candidate sets inflation. Furthermore, it is assumed that voters and wage setters are fully informed, while the political parties are uncertain about the voter preferences. The political platforms cannot fool the well-informed voters by increasing the budget, as in the rational business cycle theory. It turns out that the efficient inflation rate (the outcome of the cooperative game) is similar for the two parties. However, this policy is not credible, because voters believe that parties will depart from the cooperative policy after they are elected and that the incumbent party will choose a policy that is more in accordance with its ideology. As a consequence, an alternation between the two ideological policies of the parties leads to a welfare loss, compared to the efficient policy. It is, however, difficult to commit the political platforms to the efficient policies. Reputational forces can reduce the fluctuation between the optimal policies of the different platforms. Empirical support for a partisan cycle is in ALESINA (1988a) and ALESINA AND ROSENTHAL (1988). ALESINA (1988a) gives also some evidence for the political business cycle. It is suggested in that paper that the partisan cycle is not inconsistent with the political business cycle, if voters are imperfectly informed.

The studies discussed thusfar concentrate on monetary policies. Time inconsistency in fiscal policies is analyzed in FISHER (1980). In that paper the time inconsistency of the capital income tax is analyzed. This problem is equivalent to the example that

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35 Note the similarity with the objective of the political platforms that was presumed in Hibbs' partisan theory, discussed in the previous subsection. Alesina's approach can be regarded as a rational partisan theory.

36 Compare the Frey-Schneider approach that was discussed in the previous subsection, where politicians also have an ideological and an election goal. In that approach these goals did not follow from an optimizing framework, however.
introduced this section. The model that is used is rooted in microeconomics.\footnote{37} Individuals live two periods and maximize their intertemporal utility. They are endowed with a capital stock and choose in the first period whether they consume or invest their revenues. In the second period, individuals have income from their investments and from the labor they supply. They spend their income on private consumption and public consumption. For the finance of the public good that is offered in the second period, the government introduces a tax on labor income and a tax on capital income. The government maximizes social welfare, which is equal to the utility of the representative individual. For reasons discussed in the introduction of this section, the optimal capital income tax and labor income tax are not credible. There exists, however, a credible solution. This occurs if the government announces in the first period that labor will not be taxed in the second period and the public good will be financed with the revenues from the capital income tax only. The government can, in that case, not fool the individuals in the second period by reducing the tax on labor at the cost of the tax on their capital savings.

Time inconsistency may not only be due to the framing of the policy process, as in \textsc{Fisher} (1980), but also to changes in the preferences of individuals or, more specifically, the electorate \citep[see, for this distinction,][]{AlesinaTabellini1988}. In \textsc{Persson} and \textsc{Svensson} (1989), a model is presented where the government can tax labor income in two periods for the finance of public expenditures in the second period. There are no public expenditures in the first period. The government can, however, run a budget surplus in the first period. The incumbent party can use the government budget strategically, in particular if it expects that its successors might have different preferences. The government objective is in accordance with the preference of the median voter. Individuals vote at the beginning of both the first and second period. Changes in preferences of the voters, in the participation of voters or in the composition of the electorate may lead to a change in the preferences of the median voter and, therefore, the winning majority. Tax distortions are minimized in this case if the labor income tax has the same value in the two periods. This optimal tax is time consistent if the winning majority in the second period is similar to the majority in the first period. Suppose, however, that the median voter in the second period has a higher preference for the public good than the median voter in the first period. In that case, the budget surplus that was generated in the first period is too

37 Therefore, these models should, in fact, be discussed in Section 1.5. To avoid repetition, all the models on credibility are brought together in this subsection.

38 This set-up, thus, mimics expenditures for public pensions in an aging society.
small to minimize tax distortions. The incumbent policymaker in the first period can use the public surplus or debt strategically by running a smaller surplus than it finds optimal, in terms of minimizing the tax distortion, if it expects that in the second period a winning majority will prefer higher public expenditures. The popular version of this result states that a right wing party will run a budget surplus that is too small (or, in the real world, raise public debt) if it expects that a left wing party will win the next elections, where left wing refers to a platform that will be elected if a winning majority prefers relatively high public expenditures.

A strategic use of debt is also found in Tabellini and Alesina (1990), where two types of public goods are distinguished, and where individuals differ in preferences with respect to these goods. Debt is used to influence the composition of the public expenditures in the second period. Debt depends on the difference in preferences between the median voter (or winning coalition) in period one and in period two. If the median voter in the first period expects that the median voter in the second period has substantial different preferences with respect to public goods, it will run a large debt. It is therefore concluded that polarized societies have larger debts than more homogenous societies.

This model is elaborated in Haaparanta and Puhakka (1993), where it is assumed that the production of the public goods requires labor input. Bureaucrats in the one public sector have different skills compared to the bureaucrats in the other sector. Bureaucrats that are replaced to another office have a lower productivity than the bureaucrats that already work in that office and employees that are attracted from outside. They receive the same wage, though. The government is not allowed to fire the bureaucrats. An incumbent government can, therefore, always tie the hands of its successor. Public expenditures are financed with the revenues from lump sum taxes and, in the first period, with the creation of debt. If preferences of consumers do not change and the winning coalition (median voter) is the same in the two periods, only the most preferred good will be produced in both periods and the production level will be the same in both periods. If preferences are allowed to change this outcome is not credible. In the credible solution, the winning coalition in the first period that prefers, say, good one anticipates that there may be a winning coalition in the second period that has a higher preference for the other good, referred to as good two. Production may then shift from good one to good two. Some bureaucrats have to change office in that case, because they cannot be fired. This goes with a loss of productivity. In order to smooth the loss of productivity over the two periods, the winning coalition in the first period will also hire bureaucrats that are better skilled to produce good
two, where their relative number depends on the probability that a winning coalition will prefer good two in period two. This may give an explanation for an improductive bureaucracy. It follows, furthermore, that in the credible outcome the government provides a lower level of the most preferred public good than it would do if it knew for sure that it would remain in office in the second period (which is the case if preferences do not change). This is due to the uncertainty about the outcome of the elections in period two. The incumbent government in period one will try to insure its voters against their loss in the second period elections. If they hire too many bureaucrats in the first periods, their voters would pay taxes in the second period for bureaucrats that produce a good that is less preferred by many of the these voters. In the second period a larger bureaucracy will occur compared to the situation that preferences do not change. According to this model, bureaucracy will therefore become too large, in the long run.

A final study that will be considered here, is ALESINA AND TABELLINI (1987), where the coordination of monetary and fiscal policies is investigated. In this paper there are three instruments. Inflation and a lump sum tax are set by the government, while a trade union sets nominal wages. The monetary policy is subject to time inconsistency, while the fiscal policy is not. If monetary and fiscal policy are in the hands of one authority, there will be too much inflation and too little taxation in the credible solution. That is, social welfare can be improved if inflation is set by an independent authority, e.g. the central bank, that is more averse to inflation. The presence of an independent central banker results in a lower inflation and a higher tax. This outcome can be compared with the time inconsistent solution, where policymakers announce a policy for the current and future periods, but may have an incentive to depart from the announced policy in the future periods. Suppose that the policymakers are committed to the announced policies. It turns out that if the monetary and fiscal policies are set by two different authorities, and if these authorities have different objective functions, commitment does not necessarily lead to a higher social welfare than discretion. This conclusion is in contrast with the conclusion that was found earlier in this subsection for the situation where the government only sets monetary policies. In that situation, commitment to the announced policy gives a higher social welfare than the credible policy that follows under discretion.
1.4.4 Macroeconomic policies, elections and interest groups

The presence of a political business cycle is investigated in VAN DER PLOEG (1984) with a model that differs from the models that were discussed in Subsections 1.4.2 and 1.4.3. The model differs not only in the macroeconomic mechanisms that are incorporated in the model, but also in the description of the political decisionmaking process. Van der Ploeg distinguishes two decisionmaking processes. First, in the day-to-day running of the economy, the government is confronted with conflicting interests of different social groups; private sector workers, public sector workers and managers of the bureaucracy. The day-to-day running of the economy consists of the distribution of a given budget over the private sector wage bill, the public sector wage bill and public spending. To harmonize these conflicting interests, the government maximizes a so-called collective interest function, that weights the interests of the social groups. The weights depend on the bargaining strength of the social groups and on the ideology of the government. This part of the model is inspired by the interest function approach discussed in Subsection 1.3.5. The second part of the decisionmaking process reflects the government’s re-election goal. Popularity depends not only on inflation and unemployment, as in most studies that were discussed in Subsections 1.4.2 and 1.4.3, but also on real disposable income, the balance of payments and the tax bill. The government can use the income tax rate to manipulate popularity.

It turns out that the presence of a political business cycle depends on the assumption that is made with respect to expectations. If the adaptive expectations hypothesis is adopted, a political business cycle occurs, as long as voters are concerned with inflation. The tax rate is at its lowest level on the eve before the elections, which goes with a relatively high fiscal deficit. As a consequence, the expected inflation (that differs from the actual inflation rate), the unemployment rate and the surplus on the balance of payments are relatively low at that time, while real disposable income is relatively high. The day after the elections, the government raises taxes and reduces its deficits, which causes expected inflation and unemployment to increase and real disposable income to decrease. If, however, rational expectations are assumed, the

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39 The results depend heavily on the appearance of the balance of payments in the government’s objective. According to the objective function, popularity erodes if there is either a high deficit or a high surplus on the balance of payments. Therefore, the balance of payments appears in squared form in the objective function. This is, however, the only nonlinear part of the function. It is not clear how the solution changes if the balance of payments is deleted from the objective. In VAN DER PLOEG (1989) more or less similar results are obtained, however, for a somewhat different model, where the popularity of the government does not depend on the balance of payments (cf. the remainder of this section).
government cannot cheat the voters and leave them with the inflationary consequences of a myopic policy. In that case, the political business cycle disappears.

The day-to-day decisions are based on the maximization of an objective that is derived from the interest function approach. However, in that approach the re-election goal, that leads to the maximization of the number of votes (cf. Subsection 1.3.5), is incorporated in the political interest function that is maximized by the government. The dichotomy in VAN DER PLOEG (1984) between policies that follow from the day-to-day running of the economy and policies that follow from the incumbent politicians' desire to be re-elected seems a bit artificial.

This dichotomy is absent in VAN DER PLOEG (1989), that differs in some important respects from the model discussed above. The first difference is the decisionmaking with respect to public consumption. In VAN DER PLOEG (1984) the level of public consumption is determined by the government and follows from the harmonization of conflicting interests, while public consumption is set by the managers of the bureaucracy in VAN DER PLOEG (1989). The managers are, however, restricted to a maximum fiscal deficit that the government is willing to run and that is exogenously given. Because the managers of the bureaucracy are maximizing their budget (cf. Subsection 1.3.4), they will use the fiscal margin to maximize the public consumption level. The second difference is the underpinning of the re-election objective of the incumbent politicians. In the latter paper, Van der Ploeg derives this objective from the probabilistic voting model. The arguments in the objective are inflation, unemployment, real disposable income and public expenditures. The balance of payments is now omitted. According to Van der Ploeg the interpretation of these different arguments may reflect the interests of different social groups. A final difference between the two models is the introduction of a monetary authority, that decides upon the supply of money. It follows that the appearance of a political cycle depends on the money supply rule that is used by the monetary authority. When the money supply grows with an exogenously given growth rate or if the monetary authority seeks to hold the growth rate of real money supply constant, similar results with respect to the occurrence of the political business cycle are obtained as in VAN DER PLOEG (1984).

What the two models have in common, is that there is still a hierarchical decision structure. The policies with respect to taxation and public spending are not determined simultaneously by one institution, but hierarchically. Taking account of the re-election goal, and therefore of the effect of the tax rate on other policy variables and the
economy, the government determines first the tax rate. Then the other policy variables are set, either by the central government [VAN DER PLOEG (1984)] or by bureaucratic and monetary authorities [VAN DER PLOEG (1989)].

The policies with respect to taxes and public expenditures are determined simultaneously in VAN VELTHOVEN AND VAN WINDEN (1986). In that paper taxes and public expenditures follow from the maximization of a political interest function (cf. Section 1.3.5). As in VAN WINDEN (1983), four social groups are distinguished: public sector workers, private sector workers, capital owners and dependents. The political influence of the latter group is, however, assumed to be negligible. The interests of representative individuals of the other three social groups concern real disposable income, public commodities and the relative numerical strength of the social group. In VAN VELTHOVEN AND VAN WINDEN (1986), the government does not take account of the feedback of its policy on private sector activity. The levels of the tax rate and public expenditures that are derived from the maximization of the political interest function are plugged in a small macroeconomic model, the Keynesian income-expenditure model. It turns out that the tax rate depends only on the political influence weights and on the preferences of the representative individuals of the social groups. Furthermore, the value of the multiplier appears to be larger in the model with endogenous government decisions compared to the income-expenditure model with exogenously specified government variables.

To study decisionmaking with respect to social security, the above model is further developed in VAN VELTHOVEN AND VAN WINDEN (1985). Two groups of dependents are distinguished, those who are unemployed but are available for the labor market and receive an unemployment benefit, and those who are not available for the labor market, because they are, e.g., retired or disabled. Furthermore, members of the other social groups (public sector workers, private sector workers and capital owners) are not only interested in their own disposable income and public commodities, but also in the social security benefits, because they take account of the probability that they may become unemployed or disabled, or that they will retire in the future. However, capital owners are not interested in the unemployment benefit, because they are not entitled to this benefit. It turns out that the tax rate, the spending on public commodities and the social security policy depend on the interests of representative individuals of the social groups, the political influence structure and the tax base.
1.4.5 Conclusion

The models that were discussed in this subsection all link a political model to a macroeconomic model. In most of the models discussed in Subsections 1.4.2 and 1.4.3, the political model only loosely describes the political decisionmaking process. The government objective follows from the incumbent party's desire to become reelected (e.g., Nordhaus, Rogoff), from its ideology (e.g., Hibbs, Alesina) or both (e.g., Frey and Schneider), or the objective follows from the preferences of the median voter (e.g., Persson and Svensson, Tabellini and Alesina). Although a relation between the re-election constraint, or the ideology of the incumbent party, and the preferences of voters is suggested, this relation is not specified. The behavioral underpinning of the government objective is therefore unsatisfactory in the business cycle and partisan cycle models. The weaknesses of the median voter model were already discussed in Section 1.3. Furthermore, most of the papers discussed in Subsections 1.4.2 and 1.4.3 do not incorporate policy instruments, but assume that politicians can manipulate economic variables directly.

The economic framework is rather poor in most of the papers discussed in this section. Only some economic mechanisms are taken into consideration. For most of the papers this is the relation between a monetary variable (inflation or prices) and a real variable (unemployment, employment or output). Only a few papers contain a more elaborated model: the papers of Van der Ploeg and of Van Velthoven and Van Winden employ a small macroeconomic model, while the 1979-paper of Frey and Schneider and the model of Jongbloed link the political model to an existing large-scale macroeconomic model. These models are, however, of the 'old-fashioned' macroeconomic type. That is, they lack the microeconomic foundation that is common in the more modern macroeconomic approach (see the Prologue).

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1.5 Government behavior in general equilibrium models

1.5.1 Introduction

In the studies discussed in the previous section the political and economic submodels have a different behavioral underpinning. Whereas the political submodels are based on explicit assumptions concerning the behavior of agents, this is not the case for the economic submodels. The studies to be discussed in this section use the same behavioral assumptions for political as well as economic agents. In these studies a general equilibrium model is combined with a behavioral model of political decisionmaking. The number of computable general equilibrium models with endogenous government behavior is still very small.\(^{41}\) Examples are ZODROW (1988), RUTHERFORD AND WINER (1990, 1995) and WINER AND RUTHERFORD (1993). Some other general equilibrium models that incorporate a behavioral political model are worth mentioning, though. Subsection 1.5.2 starts with some models concerning redistribution policies, combining a (small) general equilibrium model with a median voter model. Subsection 1.5.3 discusses ZODROW (1988). In that study fiscal federalism is investigated, using a computable general equilibrium model, where political decisions of state and local governments depend again on the preferences of the median voter. The models discussed in Subsection 1.5.4 relate a general equilibrium model to a political model where interest groups lobby for a particular trade policy. These studies are of particular interest here because of their explicit incorporation of interest groups.\(^{42}\) The studies by Rutherford and Winer, combining a computable general equilibrium model with a probabilistic voting model, are discussed in Subsection 1.5.5. Subsection 1.5.6 concludes.

1.5.2 Redistribution and the median voter

The redistribution of income confronts the government with the classical dilemma between equity and efficiency. In the median voter model the balancing of these two criteria depends on the preferences of the median voter. A well-known median-voter model of redistribution is MELTZER AND RICHARD (1981). In their model the government levies a uniform income tax on all earned income to finance a per capita

\(^{41}\) Methodological issues that arise if a computable general equilibrium model is combined with a political model are discussed in RUTSTRÖM (1995).

\(^{42}\) For an analysis of lobbying in an Arrow-Debreu model, see COGGINS ET AL. (1991).
lump-sum grant. Efficiency comes in with the labor supply decision that is influenced by the redistribution mechanism. Identical utility maximizing individuals decide upon consumption and labor supply. The budget constraint restricts consumption expenditures to the after-tax earned income. Earned income depends on the number of hours the individual works and on her or his productivity, which differs between the individuals. It turns out that the number of hours that an individual works decreases if the tax rate and the lump-sum grant increase, which reflects the inefficiency of redistribution.

The median voter in this model turns out to be the voter with the median productivity. The utility of this voter depends on the labor supply decision of all individuals, because total labor supply determines the tax base for the finance of the redistribution scheme. Meltzer and Richard demonstrate that, apart from some preference parameters and the distribution of productivity over the population, the optimal redistribution for the median voter depends on the difference between the mean (or average) income and the median income. An increase in the inequality of (primary) income leads to an increase in the difference between mean income and median income. In the model of Meltzer and Richard this leads to an increase in the redistribution of income. The authors suggest that the observed growth in government size is a consequence of an increase in the difference between average income and the income of the median voter. They offer two reasons for this difference to increase. First, the productivity of individuals with an already high productivity may grow faster than the productivity of individuals with a lower productivity. Second, the composition of the electorate may change in a way that more voters have a productivity beneath the productivity of the (initial) median voter. Meltzer and Richard suggest that this may occur in an aging population. Empirical findings reported in Meltzer and Richard (1983), seem to support this view.

A more or less similar model is applied in Meltzer and Richard (1985) to study the effects of a negative income tax. The model introduces two commodities. The lump-sum grant can consist of one or both of these commodities (so-called in-kind transfers, such as medical care, housing services or safety) or the grant can be transferred as a freely disposable negative income tax. It turns out that the distortionary effect on labor supply is greater if the grant is transferred as a negative

43 Meltzer and Richard assume that redistribution is the only government activity and neglect the effect of public goods and services on the growth of government.
Furthermore, a negative income tax will only be introduced if the median voter does not work. In case the grant is an in-kind transfer, the negative effect on labor supply is not only smaller but the redistribution scheme may then also be introduced if the median voter is a worker.

In Persson and Tabellini (1991, 1992) the median voter model is used to study the effects of income distribution on economic growth. Although their model differs from Meltzer and Richard (1981), fairly similar mechanisms are at work: if the primary income distribution becomes more equal, the median voter opts for a reduction in redistribution, which has a positive effect on the growth rate.

1.5.3 Fiscal federalism and the median voter

In the United States, the federal government as well as state and local governments levy taxes. The taxes that are levied on the state or local level are partly deductible against federal taxes. The federal government decides upon the deductibility of the different taxes. If the federal government reduces deductibility, as it did in the Tax Reform Act of 1986 for sales taxes, the consequences reach further than the federal budget: it may also affect the tax policy of the state government. Zodrow (1988) studies the interaction between federal and state policies. Attention is paid to the deductibility of personal (sales and income) taxes and the corporate tax. The states are split up in two sectors with one government. The first sector contains the states where the median voter deducts personal taxes, while the median voter in the states that are gathered in the second sector does not deduct personal taxes. The goal of the study is to investigate the effects of a change in the deductibility of the personal tax for the tax policies of the two sectoral governments and of the federal government. Throughout the analysis corporate taxes are assumed to be fully deductible against a fixed federal corporate tax.

To determine the effects of a reduced tax deductibility a general equilibrium model is constructed. In this model there is one production good using capital and a fixed factor. The fixed factor can be interpreted as a combination of land and labor, for it is assumed that there is a fixed labor supply. There is no population growth, no migration between the sectors and no endogenous decision with respect to leisure and

\[44\] Administrative costs are neglected. The reduction of these costs is often brought up as an important advantage by advocates of a negative income tax.
labor supply. Capital is perfectly mobile across the sectors. Consumers have preferences with respect to the private commodity and a publicly provided private good. The public good is sector dependent and is shared equally within the sector. The sector government finances the public good with the revenues from the personal tax and the corporate tax. The level of the public good and the tax rates are determined by the preferences of the median voter of the sector. Federal taxes, deductibility rules and public expenditures are given exogenously, while the federal personal tax is obtained from the balanced budget condition.

To obtain analytical results the model is loglinearized. Simulation results for the non-linearized model are added. If the federal government reduces the deductibility of personal taxes that individuals transfer to the sectoral government the following results are obtained. First, the balanced budget condition implies that the reduction in deductibility goes with a reduction in the federal personal tax. Second, the sectoral personal taxes are affected by a number of factors, that will not be reproduced here. It is only important to note that the overall effect on the sectoral personal taxes is ambiguous, but it is likely that tax payers in sector 1 (where the median voter deducts personal taxes) face lower taxes while tax payers in sector 2 are confronted with higher taxes. Third, the corporate tax in sector 1 increases because a reduction in deductibility of personal taxes makes the use of non-personal taxes relatively more attractive to the median voter. In sector 2 the median voter does not deduct personal taxes. The lower federal taxes that accompany the reduction in tax deductibility reduce, however, the marginal (overall) personal tax rate of the median voter. Therefore, taxing capital is substituted by taxing income and sales, which implies a decrease in the corporate tax rate in sector 2. Fourth, the effect on private and public consumption depends on the income and substitution effect. In sector 2 the substitution effect vanishes because the price of the public good relative to the private consumption commodity is not affected by the reduction in deductibility. The higher income in sector 2 leads consequently to an increase in private and public consumption in sector 2. The relative price of the public good in sector 1 is affected by the reduction in deductibility. The effect on private and public consumption in sector 1 is therefore ambiguous.

The median voter thus decides upon three policy variables. In general, the median voter model fails if there is more than one variable [cf. Section 1.3.2; see also the comment of Fullerton (1988) on Zodrow’s study].
1.5.4 Trade policy and lobbying

Interest groups are explicitly introduced in some general equilibrium models analyzing the economic effects of trade policies affected by the influence of lobbying activities. Magee and Brock (1983), for example, study the influence of two lobby groups on an import tariff and an export subsidy in a two-party system. One lobby group is capital related while the other is labor related. The capital related lobby prefers an export subsidy whereas the labor related lobby is in favor of an import tariff (to protect domestic jobs). The lobby activity consists of a transfer of capital or labor to the political parties. Both trade policies are distortionary. The resulting social costs are borne by all voters. Social costs are derived from a general equilibrium model with two commodities.

The two political parties maximize the probability of receiving a majority of the votes at the next election. This probability depends, among other things, on the trade policy that the party chooses. There are some voters that neither belong to the lobby group of capital owners nor to the lobby group of workers. These voters do not benefit from the trade policy but bear a part of the social costs. It is assumed that capital owners as well as workers form a minority of the electorate. Both trade policies favor only a minority of the electorate and are therefore called unpopular.

Although the trade policies are unpopular it may be beneficial for a political party to implement a trade policy. This is the case if the party is able to transform the transfers that it receives from the lobby groups into social gains that outweigh the social costs from the trade policy. It is suggested that these gains may be obtained, for example, from information given by the lobby group about the opponent, which the political party transmits to the voters. If a trade policy is beneficial, the political parties must first choose the instrument (export subsidy or import tariff) and then determine the optimal value of this instrument. Magee and Brock assume that one political party supports policies favoring capital owners while the opponent party chooses policies which benefit workers. Consequently, the party favoring capital owners finds it beneficial to optimize the value of the export subsidy whereas the party favoring workers optimizes the import tariff. There are no other policy instruments available for the parties.

46 The information given by the lobby group may be true or false. If the politicians do not verify the information, the lobby groups have no incentive to transmit truthful information. See, for a discussion of verification policies, Rasmussen (1993).
It turns out that the formalization of the solution method is crucial for the results. The relation between the decisions of the lobbies and the political parties is in particular important. If lobbies and political parties take the decisions of the other actors as given (Cournot-Nash behavior) the optimal values of the import tariff and export subsidy are equal to zero and the free trade outcome results. If, however, the political parties take account of the reaction of the lobbies on their policy proposals (the political parties behave as Stackelberg leaders), the optimal levels for the import tariff and the export subsidy are positive. In such a setting the lobbies only take account of the effect of their lobby activity on the voting outcome and neglect the effect on the trade policies. In that case it is optimal for the lobby to concentrate efforts on only one political party (compare the discussion in Subsection 1.3.3 on campaign contributions). Compared to the situation that there are no lobbies capital owners as well as workers are worse off in the equilibrium of the Stackelberg game. There is a prisoners dilemma, however: if one lobby decides to stop its activities while the other lobby continues, the former lobby is worse off compared to the Stackelberg equilibrium.

In Grossman and Helpman (1995) the government sets import tariffs that are equal for all countries, but it can negotiate with a specific country about a free trade agreement. The free trade agreement specifies for which commodities the two countries agree upon lower (or zero) import tariffs, where it is assumed that a foreign commodity is a perfect substitute of a domestic commodity. For producers exporting domestic commodities a free trade agreement may be beneficial, whereas import-competing producers may prefer an import tariff. Producers try to influence the governmental trade policy by offering campaign contributions. As in Magee and Brock (1983), the politicians use the campaign contributions for re-election purposes. However, instead of transmitting information to the electorate, politicians use the campaign contributions to finance transfers to voters. It is assumed that the producers form a negligible fraction of the electorate. They can, therefore, only influence the trade policy by transferring campaign contributions to the politicians. The different lobbies of producers do not cooperate. Each lobby will donate for either the free trade agreement or for an import tariff, but not for both policies. First, the lobbies determine which policy they will support and the amount they will transfer to the government. Then, the government determines whether to negotiate with the

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47 Magee and Brock assume, furthermore, that lobbies and political parties are Stackelberg leaders in the games with the economy and voters, but these assumptions are not crucial for the results.
government of the other country (the favored nation) on a free trade agreement or to establish import tariffs.

A free trade agreement emerges in two situations. In the first situation, the agreement leads to a substantial increase in welfare for the voters. This result is still valid if some coordination between lobbies is allowed, because the lobbies that are negatively affected by the agreement are not able to form a coalition that is able to block the agreement. In the second situation, the benefits of the agreement for the potential exporting industries are higher than the costs for import-competing industries and the welfare costs of the voters. In that situation, it is most likely that both governments will agree upon a free trade agreement when there is a relative balance in potential trade between the countries (i.e., the potential export industries are more or less equally distributed over the two countries). The two countries will then sign an agreement on lower import tariffs for the commodities that they import not only from the favored nation but also from other countries (rest of the world). In that case, the consumer price is not affected because it remains equal to the producer prices plus the import tariff paid by industries from the rest of the world. This implies that the profits of the import-competing industries in the home country are not negatively affected by the agreement, whereas industries in the favored nation can increase their profits, because they pay a lower tariff for their export to the country their government signed an agreement with, while the sales price of the commodities is unaffected. The public revenues from import tariffs decrease in the countries that sign an agreement, which leads to a decrease in the transfers to the voters. Because the trade agreement does not affect consumer prices and reduces transfers to voters, this agreement negatively affects the welfare of voters. Grossman and Helpman therefore conclude that a free trade agreement is most likely to occur when it is socially harmful. Notwithstanding the social loss, the government will sign the trade agreement, because its objective does not only consist of the welfare of the voters, but also of contributions they receive from lobbying industries.

1.5.5 Tax policies and political support

We finally discuss the general equilibrium model with endogenous political decisionmaking of Rutherford and Winer (1990), which is applied in Winer and Rutherford (1993). In this model the government decides upon the level of a public good and tax rates on capital and labor inputs. Decisions are derived from an probabilistic voting model (cf. Section 1.3.5), which distinguishes three social groups,
with a low, a middle and a high income, respectively. Representative individuals of these social groups have (different) preferences with respect to a private commodity, a public good and leisure. All individuals receive labor income. However, only the individuals from the middle and the higher income groups obtain income from capital endowments, where the latter has a larger endowment. The production of the private commodity requires capital and labor inputs, while the production of the public good uses for the private commodity and a fixed public capital stock.

The paper presents a method to calibrate the political weights of the social groups. This calibration method uses the first order conditions that follow from the maximization problem of the government and the values of the tax rates in a benchmark year to obtain the political weights. The model is first applied to analyze the implications of changes in the tax system for the political weights. If government decisions are endogenous a change in the tax system will only occur if there is sufficient support for this change. The model is used to determine what changes in the political weights are necessary to support a given change in the tax system. The model is also applied to analyze the effects of changes in the political system on the tax rates. It is in particular analyzed how the tax rates are affected if the political influence structure moves to a situation where all individuals have equal political influence (equality of effective political influence).

In RUTHERFORD AND WINER (1995), a similar political model is combined with an adjusted version of the computable general equilibrium model presented in BALLARD ET AL. (1985) (see Section 1.2.2 for a description of that model). Compared to the model of Ballard et al., the number of consumer groups is reduced to three, government variables are reduced to one public good, a capital tax and a labor tax, and dynamic aspects (including savings) are not taken into consideration. The paper compares the capital and labor tax rates of the United States for 1973 and 1983. In that period the taxes on capital and high incomes decreased, while the tax on labor income showed a substantial increase. For 1973 and 1983 the political weights are calibrated that belong to the tax rates that existed in these years. To determine the influence of changes in political influence on tax policies, Rutherford and Winer calculate the tax rates for 1983 for the hypothetical situation that the political weights did not change between 1973 and 1983. It turns out that in that case the capital tax would have been lower and the labor tax higher than in the benchmark data for 1983. Thus, if political influence had not changed between 1973 and 1983, the capital tax would have fallen more and the labor tax would have risen to a greater extent than actually occurred. The reason that the tax changes were less dramatic is due to a
change in the political weights. Rutherford and Winer suggest that an increase in the effective political influence of poorer voters kept the capital tax from falling and the labor tax from rising further than actually occurred between 1973 and 1983.

1.6 Concluding remarks

Our overview of the literature in this chapter started with a short discussion of the concept of 'rationality'. It was concluded in Section 1.1 that the usual assumption of rational behavior is better fit to describe temporal decisions than intertemporal decisionmaking. Computable general equilibrium models were the subject of Section 1.2. Five types of computable general equilibrium models were distinguished. The first group concerns linearized models. Linearization is attractive for numerical applications. A disadvantage is that they are less appropriate for the analysis of large policy changes. Moreover, most linearized models are static and neglect decisions having a dynamic character. Dynamic decisionmaking is extensively analyzed with overlapping generation models and Ramsey models, assuming rational intertemporal decisionmaking. The empirical support for the implied intertemporal behavior appears to be weak, though. A simple choice between present and future consumption is part of the Shoven-Whalley models, where the savings decision follows from a utility function that has present consumption and savings as arguments. Although this approach it computationally attractive, and may be more in accordance with actual decisionmaking, it misses a theoretical underpinning. The fifth type of models are the econometric models developed by Jorgenson. These models use translog functions to describe demand and supply in different markets. The translog function is econometrically attractive but lacks the analytical flexibility that is required for the more complex models with endogenous government behavior that will be developed in this monograph.

Section 1.2 continued with a discussion of public policies in computable general equilibrium models. In these models policies are typically exogenously determined or derived from a normative decision rule. The optimal values of public goods are particularly determined from normative decision rules. To our knowledge, there are no numerical general equilibrium models that determine the values of tax rates endogenously, as is done in the theoretical optimal taxation literature.

Section 1.3 surveyed the literature on political models. From the studies on voter behavior it was concluded, that voters differ significantly in political interests, which
is reflected in differences in party choice between members of different social groups. For informational as well as transaction costs reasons it can be expected that politicians, facing a re-election constraint will focus on the interests of groups of voters, instead of individual voters. The political influence of these social groups does not only depend on the voter behavior of their members, however, but also on the political pressure they employ to get their interests promoted. Empirical results obtained with the interest function approach provide support for the importance of social groups in political decisionmaking.

The interest function approach was discussed in Section 1.3 and compared with three other models describing mechanisms of political decisionmaking: the median voter model, the probabilistic voting model and the Leviathan model. The probabilistic voting model appeared to have a better theoretical and empirical underpinning than the other two models. As in the interest function approach, the probabilistic voting model distinguishes between groups of voters having identical political interests. However, in the probabilistic voting model their political influence only depends on voting. Although some extensions of this model were discussed that allow for campaign contributions to influence political decisions, attention remains concentrated on the electoral nexus of political influence. Since the interest function approach is open to other mechanisms of influence, this approach will be followed here for the description of political decisionmaking.

Sections 1.4 and 1.5 gave an overview of political economic models in which a political model is combined with an economic model. In Section 1.4 studies were addressed that use a macroeconomic model. In many studies this model consists of just one equation showing a relation between inflation and unemployment. More elaborate models are generally of the Keynesian type. With respect to political behavior political business cycle models were discussed first. Although these studies suggest a relation between popularity or ideology, on the one hand and the preferences of voters, on the other, this relation is not specified explicitly. Furthermore, empirical tests of the different models do not show conclusive results. Ideology and popularity also come back in the literature on credibility. It is investigated whether policy proposals lasting for more than one period are time consistent. Imperfect information of economic agents with respect to the behavior of politicians is a key element in this literature. Again, the relation of the government objective (popularity or ideology) with the preferences of voters is typically not explicit. The theoretical underpinning of the government objective is therefore weak. This also holds for the credibility models that derive government policies from a median voter model. The studies relating the
interest function approach to a macroeconomic model seem to have a stronger theoretical underpinning of the political model. The combination of a micro oriented political model with a (Keynesian) macroeconomic model in these studies is somewhat unsatisfactory, though.

Section 1.5, finally, presented some studies linking a computable general equilibrium model with a political model. The number of studies in this area is rather small. Some investigate redistribution issues with a median voter model, whereas others focus on the influence of lobbying on trade policies. A relatively large computable general equilibrium model is used in the study on fiscal federalism by Zodrow, where a median voter model, again, describes the political process. This section was concluded with the studies of Rutherford and Winer which employ a probabilistic voting model. The overview in Sections 1.4 and 1.5, indicates that the incorporation of a political model alters the debate substantially. Insights derived from economic models neglecting political mechanisms appear to be no longer valid if the political feedback is taken into account. This was illustrated by the models on redistribution and protective trade policies in Section 1.5, for example.